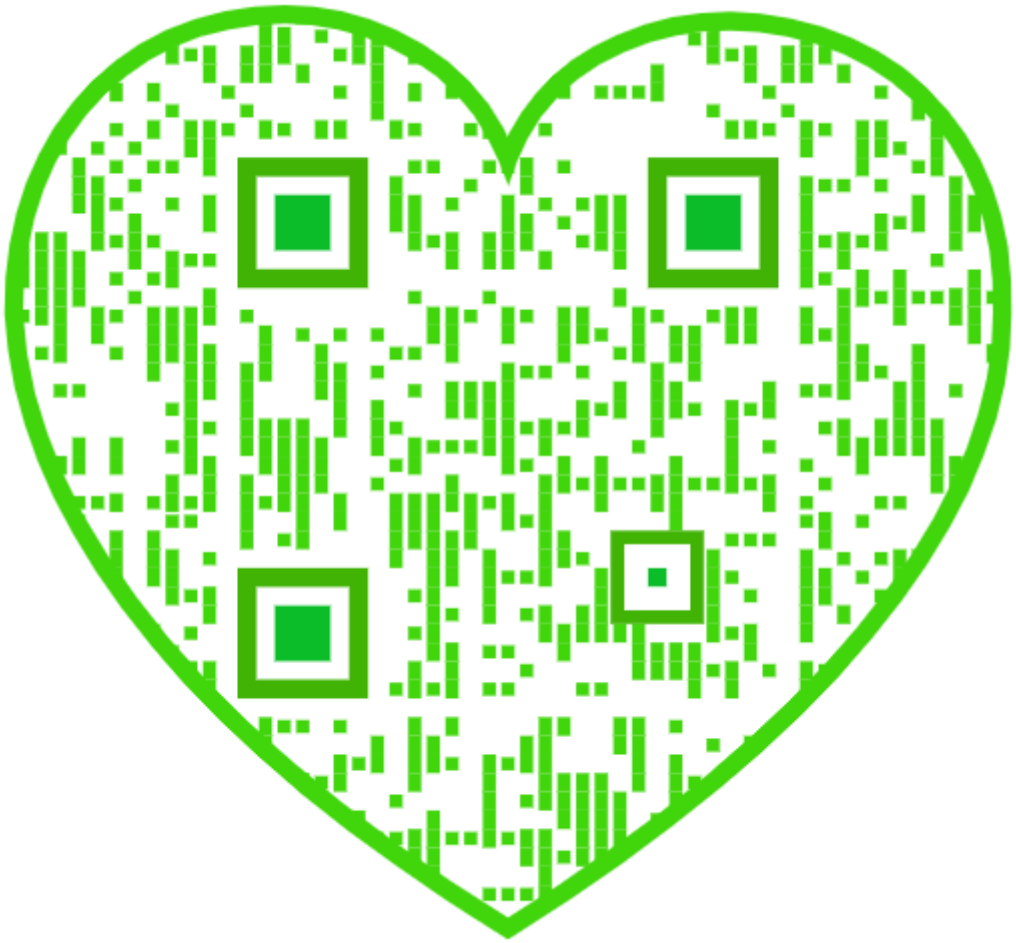
UC-NRLF
B 4 651 419

Grape Culture



Madresfield Court
Muscat Alexandria
Gros Maroc
Directeur Tisserand
Gros Maroc
Madresfield Court
Scottish Challenge Cup
for
Eight Bunches of Grapes
won by Mr Alex Kirk
Sept 9th 1908
Muscat Alexandria
Directeur Tisserand

GRAPE CULTURE

UP-TO-DATE.

ILLUSTRATED.

BY

ALEXANDER KIRK,

Practical Grower and Successful Exhibitor at the Chief Horticultural Exhibitions in Great Britain and Ireland.

LIBRARY OF THE UNIVERSITY OF CALIFORNIA

PAWSON AND BRAILSFORD, PRINTERS, SHEFFIELD.

SIMPKIN, MARSHALL, HAMILTON, KENT & CO. LTD., LONDON, E.C.

THE COUNTRY GENTLEMEN'S ASSOCIATION LTD., LONDON, S.W., AND GLASGOW.

1909.

UNIVERSITY OF CALIFORNIA
LIBRARY
COLLEGE OF AGRICULTURE
DAVIS

CONTENTS.

Chapter.		Page.
	Introduction	4
I.	Construction of the Vinery	5
II.	Drainage and Plans of Vineries	12
III.	Preparation of compost	13
IV.	Making up the borders	14
V.	Planting and subsequent treatment	15
VI.	Pruning—branch and root	17
VII.	Temperature, second year	20
VIII.	Disbudding	21
IX.	Stopping the shoots and tying down	21
X.	Before and after flowering	26
XI.	Thinning the bunches	28
XII.	Thinning the berries	29
XIII.	Second thinning	29
XIV.	Third thinning	31
XV.	Watering and mulching inside borders	33
XVI.	Watering and mulching outside borders	34
XVII.	Forcing—temperature to begin with	34
XVIII.	Ventilation	35
XIX.	Grapes commencing to colour	36
XX.	Renovating vine borders	37
XXI.	Root pruning old vines	37
XXII.	Root pruning young vines	39
XXIII.	Diseases and insect pests	40
XXIV.	Propagation	51
XXV.	Fruiting canes for pots	58
XXVI.	Exhibiting	58
XXVII.	Varieties	63
XXVIII.	Storing	66
XXIX.	New varieties	69
XXX.	Raising new varieties	70
XXXI.	Judging	70
XXXII.	"My New System" when erecting vineries ..	72

INTRODUCTION.

THE Grape Vine is one of the oldest fruit-bearing plants in cultivation, as it is frequently mentioned in the Holy Scriptures, from the record of the flood to the Crucifixion. In many countries whose climate is suitable, the growth of the grape and the manufacture of wine from its juice has for many years been an important industry. In England the cultivation of the grape is also of considerable antiquity. There is reason to believe that the plant was first introduced into this country by the Romans, and it is mentioned occasionally in the Saxon chronicles. Towards the end of the middle ages, a vineyard was included in the grounds attached to the castles and monasteries, and the Domesday Book mentions the vine in several counties. Owing to our moist climate, however, grape growing made but little progress until artificial cultivation began to be studied and understood. Until very recent times this delicious fruit was the luxury only of the wealthy classes, but the vine is now cultivated on commercial lines, and its products come within the reach of persons of very moderate incomes. The vine lends itself admirably to artificial treatment, and British grown grapes, thanks to the skill and care bestowed upon its cultivation, are excellent in appearance and flavour. The products of our own hothouses are now cheaper than foreign grapes were a few years ago, while the quality is vastly superior.

The gardener who grows everything well except the vine, is lacking one of the most interesting and important, and often a profitable phase of his profession, and this truth being now generally recognised, there exists a widespread and constantly increasing desire on the part of amateurs and professional gardeners alike for reliable information on the subject. Books on Vine Culture are few in number, and the present volume is written to meet a need for more information than is available at the present time. The author has been a practical grower of grapes for many years, and his numerous successes at the leading fruit exhibitions of the country have been recorded from time to time in the gardening periodicals. The facts and suggestions contained in the following pages are based upon his own experience and observations covering a long period of years.

31877

INDEX TO ILLUSTRATIONS.

	Page.
50 Guinea Scottish Challenge Cup .. .. .. Frontispiece	
Dublin Horticultural Show, 1895	12
Gros Maroc or Cooper's Black	16
Muscat Hamburg	20
Gros Colman	28
50 Guinea Scottish Challenge Trophy	34
Lady Downes	44
Insects (*magnified*)	48
Flower of the Grape Vine	52
Duke of Buccleuch	53
Edinburgh International Show, 1891	62
Alnwick Seedling	63
Black Alicante	63
Black Hamburgh	64
Muscat of Alexandria	65
Madresfield Court	66
Chasselas Napoleon	69
Directeur Tisserand	70
Lady Hutte	71

INDEX TO ILLUSTRATIONS IN TEXT.

Three-quarter Span Vinery, Cross Section; Lean-to Vinery, Cross Section	8
Plan of Lean-to or Three-quarter Span Vinery	9
Cross Section of Span Vinery	10
Plan of Span Vinery	11
One, Two and Three-year-old Wood	18
Vine Spurs, 18 years old, and System of Pruning to one and two eyes	19
Shoot of Fruiting Vine (first year), showing Method of Stopping ..	22
Shoot of Young Fruiting Vine; Pinching Sub-laterals	24
Shoot Growing on a Young Spur Pruned; Method of Pruning ..	25
Bunch of Grapes Badly Set	27
Bunch of Grapes before Thinning	30
Bunch of Grapes Thinned	32
Section of Lean-to Vinery; Root Pruning, outside and inside ..	38
Mildew; Oidium Tuckeri; Scalding	43
Phylloxera; Infested Root and Leaf; Healthy Root	50
Dovetail Grafting	54
Bottle Graft; Whip Graft	55
Dormant Eye; Vine Eye started; Vine Cutting, showing lower Eye removed	56
Inarching	57
Grape Box for Bunching	59
Mr. Kirk's Show Board; Show Board recommended	60
Thermometer in Wooden Case	67
Fruit Rack—Front and Side Views	68

LIBRARY OF THE UNIVERSITY OF CALIFORNIA

CHAPTER I.

CONSTRUCTION OF THE VINERY.

In fixing upon the shape, as well as the site of a Vinery, local circumstances must be taken into consideration, as to whether it is made lean-to, semi-span, or full-span. If there is an existing wall of sufficient height, and good aspect, the lean-to will of course be most suitable. Although there is no fixed width for a vinery, it is very desirable that it should be of a good width: that is, it ought not to be under 15 feet, and nearer 20 feet if this can be managed. A very fair size is 18 feet; and with a back wall of say 17 feet, this will give a rafter of 22 feet, with 4 feet in front. A drawing of a lean-to vinery is given.

In the construction of such a vinery, details must of necessity be left largely in the builder's hands, but there are certain things which ought to be considered essential. First, the stability of the structure. A 22-feet rafter of the ordinary section, say, 7 inches by 2½ inches, must be supported or it will sag very badly. This support may be given by upright pillars under each alternate rafter, with a strong angle iron running the whole length from end to end, supported by the pillars. Another method is by having strong cast-iron brackets at the bottom of each rafter bolted to the front framework, and a similar bracket at the top bolted to the back wall. This latter makes a very substantial roof, and is quite in accordance with sound construction. The main wall must be supported on pillars and arched over; or, what is still better, the wall between the pillars supported on light iron beams or plates.

Ventilation.

Another essential feature is the ventilation. No matter what the size or the shape may be, a vinery should have full ventilation, top and bottom, with means of controlling the inflow and outflow. Both bottom and top ventilation should extend continuously from end to end. In the front, the opening sashes should be hinged at the top to open outwards, that the cold air may impinge on the hot pipes. When the sashes are on centre points the cold air gets in at the top and bottom simultaneously, which may injuriously affect the lower portion of the vine, especially when the house is an early one. Similarly the top ventilation should be hinged at the top to open 1 inch or 1 foot as may be required. This should be done both top and bottom by suitable gearing worked by a wheel or lever, and should be very substantial and not easily put out of order.

Trellis.

The wiring of vineries has developed in the direction of the wires being kept further and further away from the glass. Forty years ago the ordinary distance was 10 to 14 inches; later, this was increased to 16 inches; now, many of the best gardeners prefer to have the wiring 24 to 30 inches from the glass, the reason given being that the vine leaves are less apt to get scorched or chilled with the increased distance between the glass and the leaves. The wires themselves should be not more than 10 to 12 inches apart, and must be supported below each rafter by light iron bars.

Early Vinery.

If for early forcing, a vinery 18 feet wide would require liberal heating power. There should certainly be not less than about 1 foot of 4-inch pipe to every 25 cubic feet of space. This would give eight rows from end to end, and they would be best placed six rows in front and two rows next the passage. In exposed situations a larger allowance of pipe should be made —six rows at the front and four rows next the passage would not be too much. It is the worst economy possible to have too

little heating power, as, when the low temperature comes, heavy firing and waste of fuel will take place, and the saving of the capital cost of two rows of 4-inch pipes is soon swallowed up, not to speak of the trouble and anxiety when there are 20 or 30 degrees of frost.

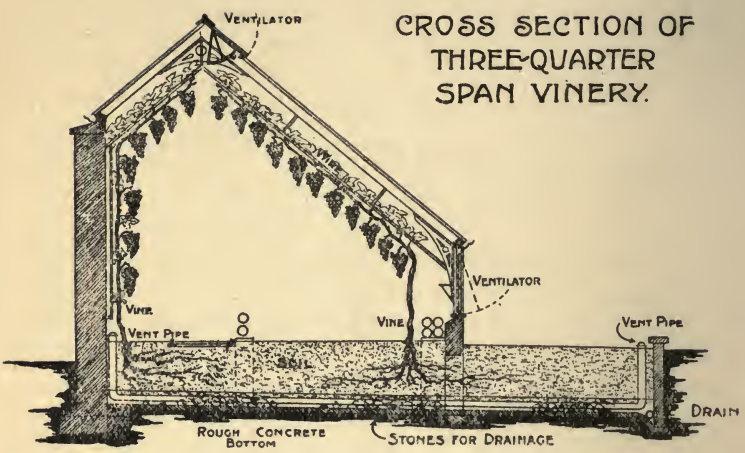
It need hardly be mentioned that where two or more houses are heated from the same boiler, provision must be made for heating each house separately.

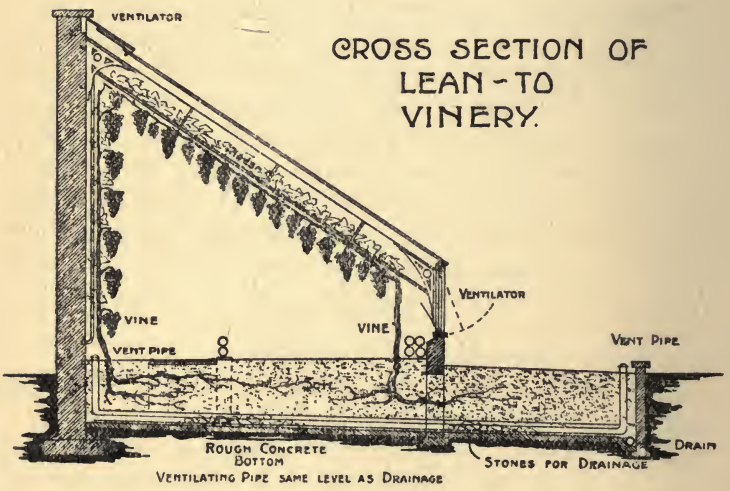
The Half-Span Vinery.

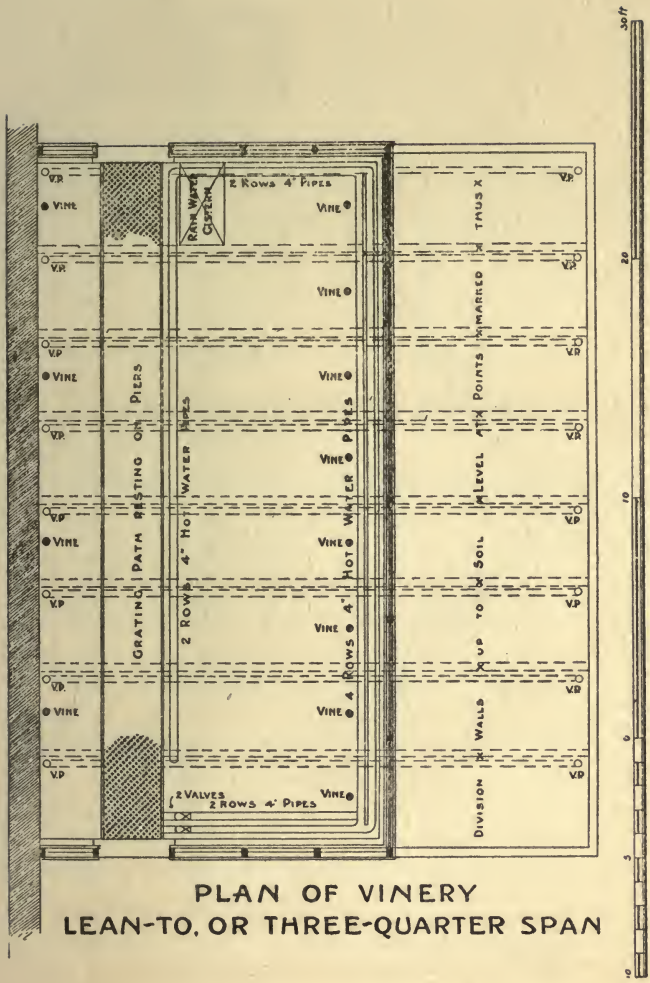
When the aspect is south, or nearly south, the semi-span vinery is considered to be preferable to the lean-to. Especially is this the case with a late house. The morning and evening sun shining through the back roof is supposed to aid the ripening and colouring very considerably. The mode of constructing a semi-span vinery is practically similar to the lean-to already described. Probably even greater care should be exercised in very thoroughly binding the roof so that there should be no outward thrust on the walls, which is the true principle of roof construction. The roof ventilator on a semi-span roof should always be on the south side; on no account, unless where exceptional reasons exist, should the ventilator be on the north side. In dealing with these two types of vinery construction, an assumed width is taken and an assumed slope, but it is by no means to be inferred that the very best grapes cannot be grown in houses of a different width and a different slope. There is no fixed rule—the wide house will grow more, but it may not follow, better grapes. In short, a good gardener will grow good grapes in a very poor house.

Span-Roof Vinery.

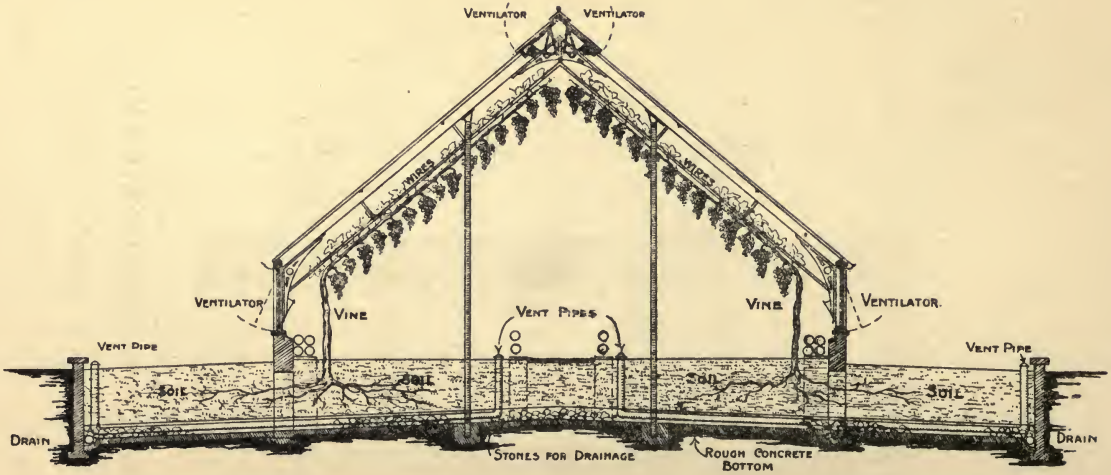
For market purposes, and where very large quantities of grapes are required, or where there are no high walls, the span-roofed form should be adopted, and there must be a radical change in aspect. In the case of the lean-to and semi-span the vinery should face the south with as little east or west aspect as may be practicable, but the span-roofed structure should run north and south as evenly as possible, so that each side may


CROSS SECTION OF
THREE-QUARTER
SPAN VINERY.
VENTILATOR
VENTILATOR
VINE
VENT PIPE
VINE
VENT PIPE
SOIL
DRAIN
ROUGH CONCRETE
BOTTOM
STONES FOR DRAINAGE

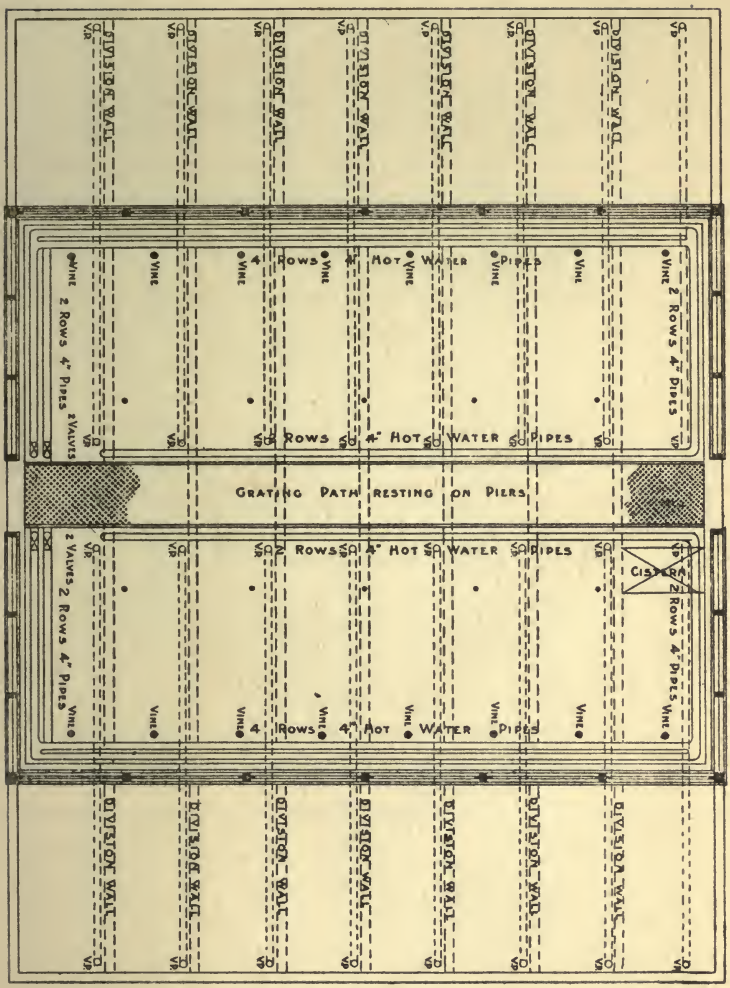

CROSS SECTION OF
LEAN-TO
VINERY.
VENTILATOR
VENTILATOR
VINE
VINE
VENT PIPE
VENT PIPE
DRAIN
ROUGH CONCRETE
BOTTOM
STONES FOR DRAINAGE
VENTILATING PIPE SAME LEVEL AS DRAINAGE



PLAN OF VINERY
LEAN-TO, OR THREE-QUARTER SPAN



· CROSS · SECTION · OF · SPAN · VINERY ·



PLAN · OF · SPAN · VINERY

get an equal portion of sunlight and heat. The span-roofed vinery, being, as it were, a double lean-to, should be very much wider if a large crop is expected. A good width would be 30 feet—equal to a double lean-to at 15 feet, and giving a rafter with not too steep a pitch of about 19 feet. The sides in this case also should be about 4 feet—1 foot of wall above floor level, and 3 feet of glasswork framing. There should be ample means of ventilation, an opening sash extending continuously from end to end each side of the ridge, and, of course, the bottom ventilation, as in the lean-to each side. A large structure like this should have upright pillars supporting the ridge, as the width is really too much to do without unless very heavy bracing is adopted, and this is objectionable, as causing obstruction to the light. A 30 feet wide vinery, even for late use, should not have less than four rows of 4-inch pipes each side. It must be remembered that in proportion to its cubic capacity a span house is much more difficult to heat than a lean-to—there is not the great shelter of the back wall. Drawings are given of this type of house.

CHAPTER II.

Drainage and Plans of Vineries.

Drainage is of the utmost importance, as vines will never thrive in a stagnated border. The border must be kept sweet and pure by a thorough system of drainage. If possible, the bottom of the border should be concreted, which is simple and inexpensive on account of cement being cheap nowadays. This cement floor should have a gentle slope from the back wall right to the outside border. Over this concrete place 9 to 12 inches of brick bats and lime rubble. Place the roughest below and the finest on the top. Rough stones may be mixed with the drainage. Aerated borders having drain tiles laid amongst the drainage serve to warm the borders to a great

Top Row—1 & 2 DUKE OF BUCCLEUCH. 3 & 4 BLACK HAMBURG.
Bottom—1 & 2 GROS MAROC. 3 & 4 DUKE OF BUCCLEUCH. 5 & 6 MADRESFIELD COURT.
Won Two First Prizes and Gold Medal in Dublin, 1895.

LIBRARY OF THE UNIVERSITY

extent, and sweeten and purify the material of which the border is composed. A considerable benefit is derived by adopting some means of this sort, especially in low-lying situations; and gardeners and botanists know how essential air is to plant growth. The depth of soil laid on the drainage may vary from 2 feet to 2 feet 6 inches.

Lean-to houses should face south; span-roof run north and south. I also recommend air pipes to be placed perpendicular on the drain pipes at the back wall, and the same at the extremity of border outside: thus connecting the whole and keeping up this supply of pure air. They have also the advantage of being closed during hard or very dry weather, and opened during too wet weather to dry the borders. The following sketch will make this more easily understood:— A ventilation which can be readily opened and shut as required should be placed on each pipe.

Distance apart for pipes, 9 to 10 feet; 4-inch fireclay pipes are used for upright ventilators; common red tile for drainage.

Grapes shown by Mr. Kirk at the Horticultural Show, Dublin, 1895, winning first for both lots, the four and the six bunches in open competition. The varieties were: Top row, left, 2 Duke of Buccleuch; right, 2 Black Hamburgh. Bottom row, 2 Gros Maroc; 2 Duke of Buccleuch; and 2 Madresfield Court.

CHAPTER III.

Preparation of Compost.

The soil best suited for the growth of the Vine is a calcareous turfy loam. But almost any soil, from clay to sandy loam, will suit. Vines will grow and produce splendid crops of grapes in common garden soil if it is properly prepared and the right material added, such as burned earth, lime, rubbish, and wood ashes. To every five tons of such compost add two cwts. vine and plant food. This will be found an excellent compost.

However, for the cultivation of first-class grapes, turf as described above is to be preferred ; and it is much better when newly cut, chopped up and wheeled on to the border ten days before planting, in the month of March.

The new turf will be found to give off a nice bottom heat, which is to be desired for the young vines. The same quantity of vine and plant food should again be used as recommended for the ordinary garden soil—that is, 2 cwts. to 5 tons soil. The coarse grade of this plant food is here used with one ton old lime rubbish. The turf should be chopped into pieces about three cubic inches in size, and well mixed. I do not advise the use of ½-inch bones for vine borders, for they will be found to be as fresh twenty years hence as when put in. My coarse grade gives good results, mixed as already stated. It is both quick-acting and lasting.

CHAPTER IV.

Making up the Borders.

The time to make up these depends on season and state of soil. Upon no consideration make up all the border at once. Add to it as the vines extend ; 3 or 4 feet inside will be sufficient for the first two or three years. When the vines extend their roots through this made-up border, remove the loose soil down to the drainage, and add two feet of fresh compost every two years. When making up borders, as soil or compost is wheeled in, lay a turf, green side downwards, all over the drainage, and a similar turf use for building a retaining wall. With this biennial addition to the borders it is better if the drainage is put in then to the extent of one foot more than the border is made up, or at least very little drainage, for the old material must always be cleared out down to the concrete when making an addition to the border. The tiles, of course, are permanent, as explained in Chapter II.

This system of making up vine borders is becoming general, and is to be preferred. It is applicable to both outside and inside borders. By adding to the borders every alternate year the vines can be kept in splendid condition and in vigorous health for many years. They will annually produce high-class fruit by adopting this system of cultivation. I must not omit to say that vine borders can hardly be made up too firm, and the soil should never be wet.

CHAPTER V.

Planting and Subsequent Treatment.

Vines may be planted at any season—spring, summer, or autumn. The usual practice thirty years ago was to plant in spring the ripened canes of the previous year's growth. When this system is still adopted, turn the vines out of their pots and shake away the loose soil from the ball, and plant them into the newly made-up border in March; spread out their roots over the soil, radiating from the centre. The roots must be kept as near the surface as possible. Place 6-inch fresh loam over the roots, tread firmly, and give a good watering; put a neat stake to each vine and tie loosely.

To plant, however, in May, June or July, young growing vines struck from eyes the same spring is by far the better method to adopt. The mode of planting differs from the above in that the ball of soil must not be broken if possible at all. Plant into the new fresh compost, cover the ball with 6-inch fresh, turfy loam, water well—this time with lukewarm water, having made all very firm. Mulch with old mushroom-bed manure. Shade after planting for a few days and keep the vinery close till they commence to grow afresh.

The distance apart to plant vines depends on the method of training to be adopted. The single rod system requires to be planted from three to three-and-a-half feet apart. The

two-rod system requires to be planted from seven to eight feet apart. This may be taken as general. One-year-old vines planted in March into newly made-up borders are encouraged to make roots by the gentle heat these borders produce by fermentation of the fresh turf, of which the borders are mainly composed ; and the buds will break strongly under the influence of sun heat. As soon as the buds have started half an inch, remove them down to the front sash and leave three buds on the cane, one on each side and one to grow on as leader. Pinch the leader when it makes four feet of growth ; train the other two, one on each side the leader. All the three canes will run to the top of the roof the first season.

Vines struck in spring from eyes and planted in the following May, will also run to the top of the house the same year. Encourage growth as much as possible, and tie in all lateral growths to trellis the first season. Plenty of good leaves and wood will ensure also plenty of good roots for next year's work.

Temperature : First Year.

The temperature required for newly planted and well ripened canes of the previous year's growth is 50° to 55° Fahr. by night, with 8° to 15° higher by day. Keep the house moist by sprinkling the paths and border with water twice daily.

When the vines have started into growth, raise the night temperature to about 60° ; give air in the morning as soon as the sun raises the thermometer to 70° ; increase the amount of air by top ventilator till the temperature rises to 80°. In order to dispense with fire heat as much as possible, close the house early in the afternoon. Young vines struck from eyes in spring and planted in summer as previously stated will require a close moist atmosphere, temperature 65° to 70° at night, with 8° to 15° higher by day. These must have a humid atmosphere till well started into growth. All ventilation must be given at the top or roof ventilators when air is required. Close early and damp down. I may mention here that this damping of floor, etc., should never be done when the house is low, as a low temperature favours the production of mildew if damping

GROS MAROC OR COOPER'S BLACK.

LIBRARY
OF THE
UNIVERSITY
OF
CALIFORNIA

is then done. With the increased hot weather, the bottom ventilators must needs be resorted to, giving a free circulation of air to the vines. As soon as the wood bigins to ripen, increase the amount of air and reduce atmospheric moisture, when the canes will assume a dark-brown colour. Open all ventilators and admit as much air as possible. This will keep the foliage clean and healthy until wood and roots are thoroughly matured, which will be about the end of September.

CHAPTER VI.

Pruning (Branch and Root).

Pruning young vines, or cutting the young vines down the second year after planting, is an operation which will require to be done the first week in January, or as soon as the foliage has fallen. Cut the leader down to two or three feet from where it started the previous year, and cut the side shoots close in to the main rod. If the two-rod system is to be adopted, leave two leaders instead of one. No matter what the strength of the vines may be, the lower they are pruned the stronger will they grow. Let me here state that if the leading shoot was pinched as it should be when four or five feet long, it will be a great advantage to the cane, especially to that part which is left after pruning. It is thus important to obtain a good foundation for good fruiting vines. After pruning, if insects are troublesome, wash the vines over with a soft brush with a solution of Gishurst compound—one ounce to a gallon of hot water, or even dip the brush in warm water and rub on the compound, which is an effective method. Wash every part of the woodwork with soft soap and hot water. Limewash the walls and cleanse the house thoroughly, and take care never to damage the buds of the vines. Examine the border and see if the young vines have extended their roots into the new soil made up the previous year. If the roots are found to be running into the old garden soil, cut them back, and they will be found

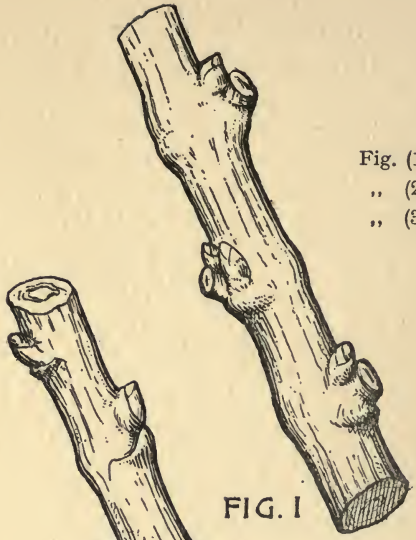


FIG. 1

Fig. (1) One year old wood.
,, (2) Two ,,
,, (3) Three ,,

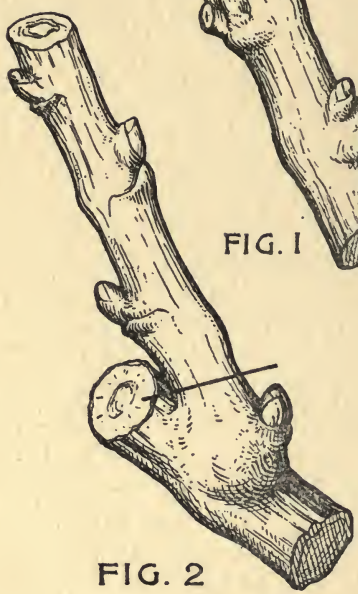


FIG. 2

FIG. 3.

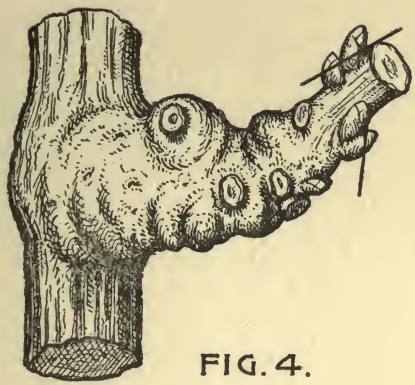


FIG. 4.

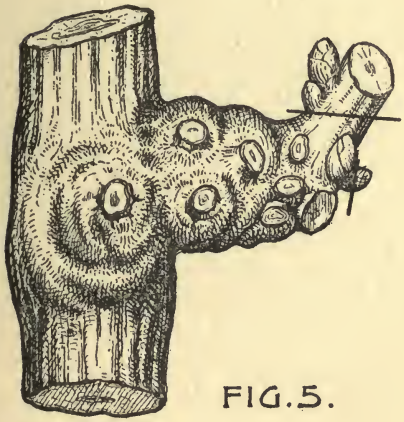


FIG. 5.

Fig. (4 & 5) Showing Vine Spurs 18 years of age and System of Pruning to one eye and two eyes.

to make ten roots for every one they would otherwise make. This, therefore, is an important item. Young vines are much improved by throwing out a trench three or four feet from the plants, from end to end of border. Just shave off every root down to the drainage. Re-fil the trench with the same soil, adding some fresh loam and a little vine manure. Mulch with moss litter or similar material.

CHAPTER VII.

Temperature: Second Year.

In this chapter I will endeavour to explain how to manage the temperature or ventilation of the vinery the second year after planting. On March 1st apply a little fire heat and close the house with sun heat early in the afternoon, keeping the temperature from 50° to 55° by night, and 10° to 15° higher by day. Keep the house moist as explained in a previous chapter, and the buds will soon swell. If there is any danger of the point bud running away before the others, let down the canes to a horizontal position. As soon as all buds are fairly started, tie up the canes again to the wires and increase the night temperature to from 55° to 60°, with 10° to 15° of a rise for sun heat by day. Gradually increase the temperature at night to 65° for such kinds as Black Hamburg. Muscats require a much higher temperature, especially when in flower, requiring to be kept at 70° by night; day temperature 10° to 15° higher. Airing must be done only by top ventilators until after the grapes are all well set, but a little chink may be admitted at the bottom when the day is very hot, gradually increasing the supply as the day lengthens, both top and bottom.

Always avoid extreme hot pipes, even in cold weather, as this does more harm often than letting the temperature down. If houses are kept 5° higher by day than that recommended for night by artificial means, it is ample.

MUSCAT HAMBURGH.

L
C
UNIV
OF
CALIFORN

CHAPTER VIII.

Disbudding.

Disbudding is the first step in training the vine. The time for this operation is when you see more buds breaking than are required. Go over the vines and rub all the buds off except two to each spur, which spurs should be 18 inches apart. The following is a very safe practice :—As soon as the fruit can be seen, or rather the embryo bunch can be seen in the point of the young shoot, rub one off. The temperature should then be raised to 60° at night; 15° to 20° higher by day with sun heat. This twenty of a rise includes sun heat. These temperatures are all intended for shaded thermometers. I also recommend having a clasp with two indicators, one at night temperature and the other at the day. I keep mine generally twenty degrees apart, and keep the mercury as near the indicators, day and night, as possible. Keep the atmosphere of the house humid by sprinkling the floor with water once or twice daily, according to the nature of the weather. I never use a syringe in my vineries except in cases of emergency, as for instance, overheating when starting, by artificial means. I may then syringe the rods to prevent attacks of red spider. But all going right I never have a syringe inside the vineries. Ventilate from the top, and do this carefully, watching the weather. (See chapter on ventilation).

CHAPTER IX.

Stopping the Shoots and Tying down.

As soon as the shoots have extended one or two joints beyond the bunch, pinch the points of the shoots; also pinch the leading rod after it has made four feet of young wood. Pinch

FIG. 4.

Shoot of Fruiting Vine (First Year), showing method of stopping.

out all tendrils. The adjoining illustration will give a good idea of how to do the pinching. This stopping causes basal buds to become plump. But it also directs the flow of sap to the bunch; and the pinching has the effect of causing good bunches on good, young wood next year. Stopping of these shoots, as in illustration, does not check the growth of the vine in the least. It is a great mistake to allow the shoots to grow and then have to resort to the knife. After this pinching of the shoots, other shoots will start from the axils of the leaves. These are termed sub-laterals, and should be pinched to a leaf. Rub out all shoots afterwards throughout the season. I believe Muscats are the better coloured if allowed a little more freedom of growth. The leading shoot is allowed to grow its entire length after the first pinching. Should lateral shoots break, pinch them at first leaf; or if plenty of room, they may be allowed to develop, only never crowd your shoots. Care must also be taken that all pinching is done before the first appearance of colouring, as any thinning out of laterals then—as is often done—results in shanking, which is to be guarded against. It is better to leave any such until after the grapes are ripe.

Many shoots show two bunches; as soon as it can be ascertained which is the better, pinch out the other.

Tying down the Shoots.

The vine naturally grows upwards towards the light, and tying the shoots down to their proper position on the trellis requires great care and patience.

As a rule never attempt to get your shoots down all the way at the first tying. Be cautious and go over them every second day until you have them into their right position. It does not matter much which side of the wire the shoots are tied to. If tying is done hurriedly, the shoots will be broken as a result, as they come out of their sockets very easily at this stage. If you wait until the shoots get woody, they can be tied down with very little breakage. The temperature at this stage will range from 60° to 65° by night, with the usual 15° higher by day.

Shoot of Young Fruiting Vine,
10 days later
Pinching Sub-laterals.

Shoot Growing on a Young Spur Pruned, also showing Method of Pruning.

CHAPTER X.

Treatment before and after Flowering.

Before the vines come into flower, examine the borders with the border tester and see if they require water, as there will not be an opportunity to water until the fruit is set. If the vines are old and exhausted, sprinkle the border over with vine manure. Water it into the soil and mulch border with moss litter, or anything convenient as spent mushroom-bed manure. This prevents evaporation until fruit is set. This is a very critical period in vine culture. During flowering, retain a warm, dry atmosphere in the vineries. The temperature must be kept high during flowering—70° to 75° at night for Muscats, with the usual rise by day. Most others and vineries in general will be 4° or 5° less. Now is the time for careful airing. Keep a warm, buoyant atmosphere. Keep on the heat unless very sunny, and also take every opportunity of having a circulation of air. Avoid cold draughts, as these cripple the bunches.

Pollination.

When the vine is in flower, go over the bunches at midday and collect the pollen of free setters. This is done by giving the cane a sharp tap, meanwhile holding a pane of glass beneath to receive the pollen, which can be applied with a camel hair brush to shy setters as Muscats. Be careful to give attention at this stage, never allowing the temperature to fall at night below your standard. Occasionally and daily brush the bunches gently downwards with a rabbit's or hare's tail mounted on a stick.

The pollen may be blown on to the shy setters from the pane of glass above described. If these details are in any way neglected the result will be badly set bunches—some may be set at shoulders and not at the point. A chink of air at night when there is no fear of frost is advisable, to allow the escape of undesirable moisture in the atmosphere.

FIG. 8.

Badly Set Bunch of Grapes.

When the fruit is set, hang pieces of lead on the points of the bunches that show a tendency to be curved or one-sided. Also twine in and secure the long shoulders of such bunches on Black Hamburghs, &c. But those with stiff shanks cannot be thus twined around to increase the size and symmetry of bunch—such kinds are Gros Colman and Lady Downes.

This is rather an art in grape growing—managing to work in the long shoulders that seem to come as a supplement to the main bunch, but which cannot often be easily dispensed with. Another point requiring attention at this time is to cut out one of the points when more points than one are forming on a bunch.

CHAPTER XI.

Thinning the Bunches.

This is a work of very great importance, and to do it properly requires experience and knowledge. To allow every spur to bear a bunch would be far too heavy cropping, and would cripple young vines for years to come. If one-third of the bunches were removed, what is left would be a fair crop. This, of course, depends on the vigour of the vine, and a good surface of well-developed foliage, and also the size of the bunches that are to be retained. All these circumstances must first be taken into consideration. A few large bunches are to be preferred to many smaller ones. Two-year-old vines will carry two bunches each, averaging 3 lbs. to 4 lbs. in weight. Look over the laterals at this stage, and do any pinching required. As soon as bunches are all well set, lower the temperature 5 degrees at night, or to what it was before flowering. Close early in the afternoon and commence damping again. Damp in the morning and at closing time in the afternoon.

GROS COLMAN.

LIBRARY
OF THE
UNIVERSITY
OF
CALIFORNIA

CHAPTER XII.

Thinning the Berries.

Thinning out the berries is rather a delicate operation, requiring a considerable amount of practice to be able to thin a bunch of grapes to perfection. The variety must be taken into account when thinning, whether large or small berries, also a large or small bunch. As a rule large bunches require to be gone over twice before stoning, and a third time after stoning. In proceeding to thin a bunch of grapes, first tie up the shoulders as in illustration. Next begin to clip out the small berries at the point of the bunch, working upward, towards the shoulders, meanwhile holding the bunch up or whatever way you wish by means of a thread of matting run through the point of the bunch. The matting is held in the left hand while the scissors are managed with the right, and the bunch is thinned without damaging or touching with the hand. Always train the bunch into the proper shape; cut out the inside berries. Never try to regulate the berries in the first thinning; always cut out the small berries which you suppose to be stoneless. Each berry places itself in the right position as it swells. Thin when the berries are about the size of radish seeds, except Muscats and shy setters, which must be allowed to develop more than this. Keep temperature steady—65° at night generally. Shut up houses early in the afternoon, with sun heat 90° will do, remembering to damp down. Give a little top air in the warmest part of the day. Avoid cold draughts.

CHAPTER XIII.

The Second Thinning.

This is performed about six days after the first thinning. The aim to have in view is to produce a bunch which, when finished and ready for table, will retain its firmness and shape.

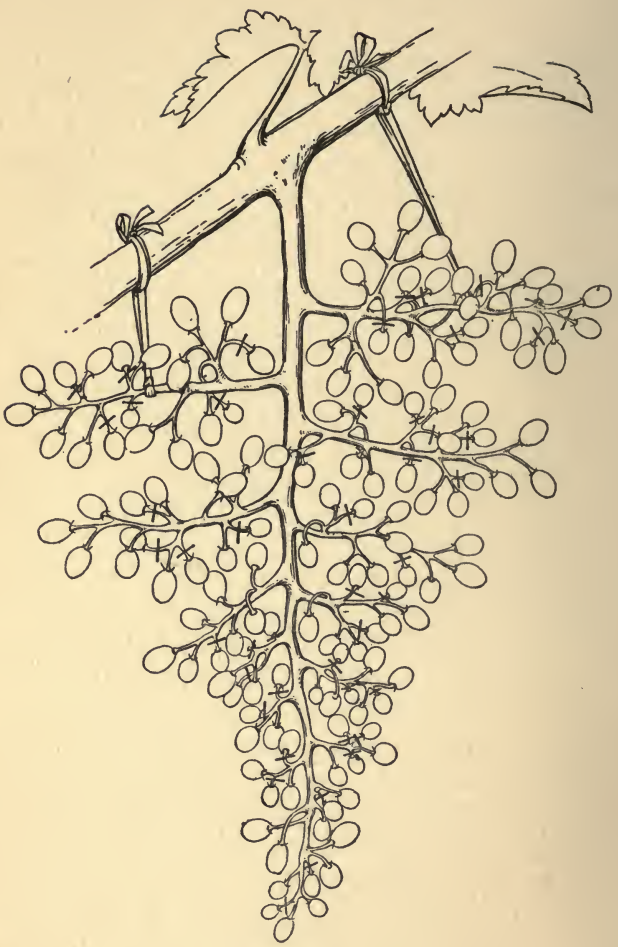


FIG. 9.

Bunch of Grapes before Thinning with shoulders tied up.

LIBRARY OF THE UNIVERSITY OF

Aim at having this compact, firm bunch well supplied with berries right over the shoulders and coming close to the stalk of the bunch. Grapes at this stage should never be touched with the hand or the hair, the result of such would be detrimental to the bloom and disfigure the grapes. Thin out the berries at this stage which are weak in the foot-stalk, and keep a sharp look out for berries which are slightly transparent—these berries, not having been fertilised, must be cut out. Also keep a look out for red spider, and sponge the foliage with hot water and soft soap before it spreads. Retain a humid atmosphere by damping the floors and borders in the morning and afternoon. Avoid excessive moisture in vineries, as this produces warts on the leaves, and gross, badly-ripened wood, resulting next year in tendrils instead of bunches; but, worse than all, mildew, especially if the heat is down. At this stage close the vineries at 90°. If the weather is mild, begin to leave a chink of air on the top of the houses, this will keep the vines and foliage healthy.

CHAPTER XIV.

Thinning the Third Time.

It requires an expert hand to thin a bunch at one operation, except small bunches which may be so done. Large bunches generally require to be gone over the second and third time. At the second thinning take great care to cut off all small bunches; regulate and remove the berries in accordance to the variety under treatment. Also consider the size of each bunch and the weight you intend each vine to carry. If over-cropped, the grapes will fail to put on a perfect colour and bloom. Badly-coloured grapes are only second-rate in flavour, and over-cropping sometimes causes shanking. On the other hand, too light cropping of young, vigorous vines will just cause gross wood, which is seldom, if ever, properly ripened or matured, resulting in shanking or a crop of tendrils instead of bunches, which is also caused by too humid an

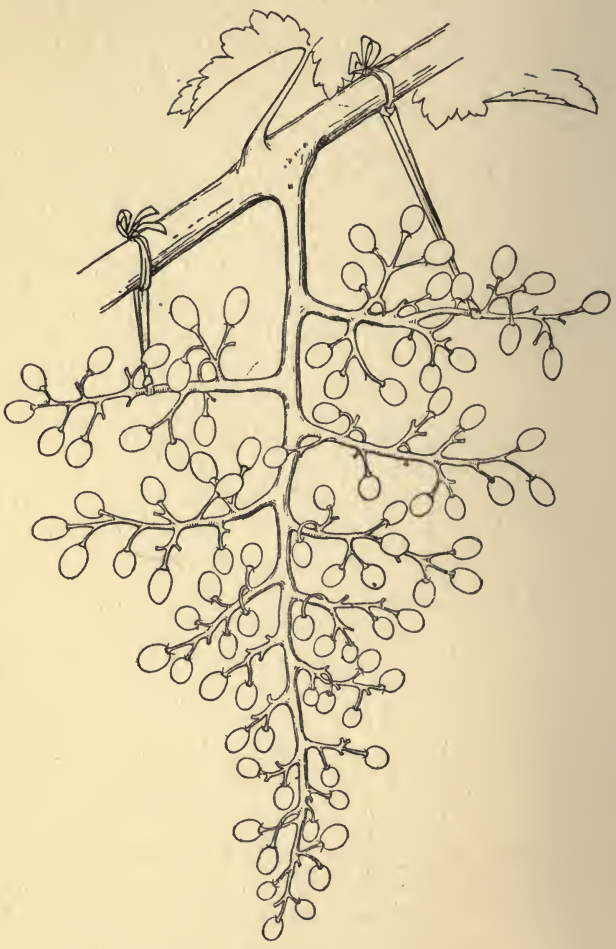


FIG. 10.

BUNCH THINNED.

atmosphere, and third gross roots, which perish completely during the winter. And so on from year to year.

After thinning the third time, give the borders a sprinkling of vine and plant food, and water thoroughly into the border. Attend to airing, particularly in the morning. Allow a rise of 8° or so, then open the ventilators. Increase the supply gradually, according to outside conditions. The bottom ventilators will now have sometimes to be used. Damp down and shut up with 90° sun heat. Keep night temperature 65°, although it will often run up to 70° at nights without much firing. Look over the vines and keep all sub-laterals pinched at the first leaf.

CHAPTER XV.

Watering and Mulching Inside Borders.

The watering of vines has been previously referred to. One thing is certain, and that is, that a properly drained, well made border is not very easily over-watered. A liberal supply of water at about 80° should be given when the house is closed down for starting. Another before the grapes come into flower. A third after they are thinned; a fourth after the second swelling; a fifth when they begin to colour. Over or under watering will have a bad effect on the vines and cause shanking, which is to be dreaded, especially when the drainage is inferior. Although I have laid down these rules, never water until you have used the border tester to see if your border requires watering or not. These rules are only intended as a guide when to examine your borders. Drive the tester right down to the drainage; give it a turn or two, pull it up, and you will see exactly the state of the soil. I strongly advise mulching all vine borders with spent mushroom-bed manure, moss litter, or such like, as already explained. This should be about three inches thick. This mulching favours the production of numerous surface roots, which are of inestimable value.

CHAPTER XVI.

Watering and Mulching Outside Borders.

These must be attended to in this matter if the weather be dry and hot. Supposing the vines are being heavily cropped and a good finish is doubtful, apply a good watering of vine and plant food to both outside and inside borders. A temperature of 80° in the vineries will turn the scale in your favour and a good finish will result. This treatment will also prevent an attack of red spider, and if it be already, will prevent its spreading. The old plan of withholding water from vines when colouring generally ends in disappointment. As a rule give extra waterings in dry, hot seasons to outside borders. These require watering in such seasons four or five times. Always use the border tester as advised for inside borders. I believe that nine out of every ten new-made outside vine borders are neglected through want of water. The system of watering vine borders with cesspool sewage or farmyard urine will only sour the borders and destroy the roots of the vines. In a few years the borders become sodden under such treatment, and not a root will be found near the surface.

CHAPTER XVII.

Forcing and Temperature to begin with.

Night temperature to begin with should range from 50° to 55°, with the usual 15° or 20° I recommend by day, keeping the glass about 65° if fire heat has to be applied. As soon as the bunches are visible in the points of the shoots, raise the night temperature 5°, and the day accordingly. Raising temperature should always be done gradually until the grapes are in flower, when the night temperature should be 65° for Hamburgs and all free setters—Muscats requiring a night temperature of 70° or more when setting. When a good set is secured, lower the night temperature 5° and day accordingly till after the stoning period, when a few degrees higher may be given if necessary to force on. This will also keep up a nice, bracing atmosphere.

Top Row—1 MADRESFIELD COURT. 2 MUSCAT ALEXANDRIA. 3 MADRESFIELD COURT. 4 DIRECTEUR TISSERAND.

LIBRARY
OF THE
UNIVERSITY
OF
CALIFORNIA

CHAPTER XVIII.

Ventilation.

This is one of the most important chapters in the book. As a rule air should be given daily from the day the vines are started till the day the grapes are cut down. Even in inclement weather change the air in your vineries, if possible by admitting a little air at top of house for a few minutes. This helps the foliage to be healthy and clean. A good deal has been mentioned already about ventilation. When airing is done properly the glass is dried slowly. No extremes; no scorching. If the moisture is evaporated too quickly scorching is the result, as the top of the house is at boiling point. It is when there is moisture condensed on the foliage that scorching takes place. Get this dried up before the sun gains much power. As soon as the day is bright and the sun well up, admit air, top and then bottom, until the maximum is reached. In the same manner reduce the supply in the afternoon; close the house early enough to secure a rise in the temperature. The vines will thrive under such treatment. The man in charge must keep his eye on the weather, and when cold winds and clouds are to be contended with, sometimes it is best to close up, as these cold draughts cause a serious check to the vines.

During the stoning period a sufficient quantity of heat should be given so as to admit a constant supply of fresh air, both by night and day. This is a very trying time for such kinds of grapes as Lady Downes and Muscats. Scalding is a term applied to grapes that have got their epidermis blotched or scalded in appearance. It makes its appearance just when the berries are finished stoning, and is termed by many a disease. It is caused through imperfect ventilation. Throughout the entire period of stoning give the grapes plenty of time. Too high temperatures should not be practised, neither too much atmospheric moisture, which will be sure to

cause scalding. Night temperature should never exceed 70°. Air in the morning before the temperature reaches 75° to avoid scalding, and never let it run above 85° with sun heat, unless the air of the vinery is very dry.

It will now be seen that grapes require a great deal of attention to ensure perfection.

CHAPTER XIX.

Grapes commencing to colour.

For grapes commencing to colour, a day temperature of 80° to 85° (sun heat); night, 60° to 65°, with a free circulation night and day, is indispensable for laying on the bloom, for colour and finish. At this stage give the borders inside and out another good sprinkling of vine and plant food, fine grade, the coarse grade I do not advise for surface dressing. Water it well in. Mulch with litter. This will be the last watering for the season, unless in exceptionally dry, hot weather. But test the borders regularly after this date and see that they do not suffer from want of water. Ventilate early and keep a circulation of hot water in the pipes if the weather is cold. This will prevent a check or chill. Pay attention to night air at top and bottom ventilators, so as to prevent moisture condensing on the glass and on the berries. This is often called "sweat" on the berries, which must be avoided, as it spoils the bloom. The temperature at this stage will sometimes run very high; this will do little harm if there is abundance of air. Colouring grapes depends a great deal on the care and work bestowed upon them during the growing season and adjustment of crop; full exposure to the light from start to finish, and, above all, due supplies of nourishing food in a soluble condition; properly watered, humid, and dry atmosphere when required.

CHAPTER XX.

Renovating Vine Borders.

This can be done in various ways. When good fruit is grown, and especially when grapes of the highest quality are produced, there will be a tendency to a falling off in quality and quantity as the vines get older. The experienced cultivator will at once examine the borders, which will be found to be heavy, sodden, and not a root to be found near the surface. To replant new vines means a heavy outlay; but there are various ways in which the old ones can be improved even without loss of crop. First, by lifting their roots and removing the soil downwards. Relay the roots among fresh compost, similar to that recommended for making up borders. This should be done before the leaves fall, generally the end of September and first week of October are the best times for this operation. This applies to both outside and inside borders, only it is not advisable to do both the same year. I advise doing the outside border one year, and the inside one the following.

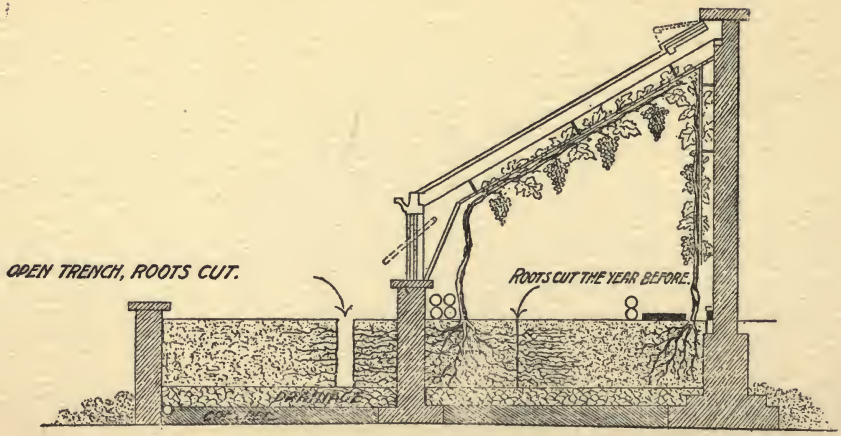
This year (1906) I have just lifted most of my vine roots nearly to the front wall.

CHAPTER XXI.

Root Pruning Old Vines.

This is another method of improving old vines, and it is so important a matter that I thought it advisable to have a chapter on it alone. I have practised this for years with good results.

Take out a trench two or three feet broad from end to end of the border; clean well out right to the drainage, and see that this gives no sign of being blocked up. If so, remove the



Section of Lean-to Vinery, showing how to Root Prune outside, and the advantages of Root Pruning inside.

rubble and put in fresh brickbats, etc. (See chapter II. on drainage).

The trench should be four or five feet from the front of vinery. Cut the roots straight off right down to the drainage. Refil the trench with fresh turfy compost and some vine and plant food. I have long used my own vine manure (Kirk's Vine and Plant Food), and I owe a great deal of my success to its favourable qualities. It is a powerful fertilizer, and must not be carelessly handled. It is also very important to bear in mind that whenever a vine border is renewed, or any addition whatever to the border, lime must never be forgotten, as it is essential for the formation of the stones in the berries. This work of root pruning, etc., must be done also early in the season so as to get the roots into the new compost before the leaves fall. But the same time will suit as recommended for lifting and re-laying roots—end of September and beginning of October. In a few years, open the new trench and it will be full of fibry roots. Then, by adding another trench both inside and outside every two or three years, the vines will be kept fruitful and in good health for many years to come. When grapes are not progressing satisfactorily, and the cause is found to be that the roots are too far down, get the above operations carried out at once; never mind if the leaves flag a bit—it will improve your vines in the end.

CHAPTER XXII.

Root Pruning Young Vines.

I HAVE cut the roots off young vines in the same manner as old ones, and refilled the trench with fresh compost with great success, especially when the vines were inclined to become gross. As a result of this practice, I am convinced that vine roots should be cut back the same as other fruit trees.

If young vines are making gross wood, they are also making gross roots, which perish during the winter. I am not a believer in lifting and relaying vine roots into new compost unless they are well supplied with fibry roots ; otherwise I never saw good results, as long, bare roots of vines are no use to lay into new borders. If this is practised these roots perish. It is much better to make your trench and prune as already advised and explained in last chapter. These young vines will be sure to send out numerous fibry roots when the vine comes into action. I have cut the roots of young vines three feet from the rods three years after planting, and also cut the roots off vines six feet from the stem twenty years planted. Successful practice has thus convinced me that both old and young vines can be greatly improved by root-pruning, renewing the borders in the way described in the preceding pages.

CHAPTER XXIII.

DISEASES AND INSECT PESTS.

Shanking.

Of all diseases *Shanking* is the worst that the grape cultivator has to contend with. As to how shanking is caused is a difficult question to answer. The first signs are noticed just when the berries commence to change colour, and all that the eye can detect is just a black streak and a black thread round the stem of the berries. The growth of the berries is then arrested, and they shrivel and become sour. Sometimes a few berries only will be affected, and at other times the whole house will be attacked.

Shanking arises from many different sources, rather than from any one in particular. It may be caused by the following :

1st. Over-cropping.
2nd. Destruction of the foliage by Red Spider.
3rd. The stripping off of a great quantity of developed foliage at a time.
4th. Checks and chills through bad ventilation.
5th. The roots getting into cold subsoil.
6th. The borders becoming sour and sodden.
7th. It may be caused by the border becoming dry at the time when vines must have abundance of water.

Avoid all these evils and you will not be much troubled with shanking.

When shanking makes its appearance it is sometimes very difficult to trace it to its true origin. If all vine borders where vines had produced grapes that were subject to shanking were examined, it would be found that nine out of every ten of these borders were far too rich, containing abundance of organic matter in which the vine will grow with great vigour, but will fail to ripen their wood and their roots, the latter perishing during winter. The following season a new supply of young roots has to be made ; and so on from year to year. The roots of gross vines, although plentiful, are very soft and spongy, and when the strain upon the energies of the vines takes place with a heavy crop of fruit to finish, the roots are not in a proper condition to meet the demand made upon them, and in this condition you may expect shanking. The first check will take place about the time the grapes finish stoning, when you will notice shanking putting in its unpleasant appearance, and will visit the cultivator annually until the borders are put right by lifting the roots and relaying them in sweet porous compost, as described in Chapter 23. With this provision and over-cropping avoided, chills prevented, red spider kept in check, a change for the better will take place. But once let the roots descend into the cold subsoil, shanking will again put in an appearance.

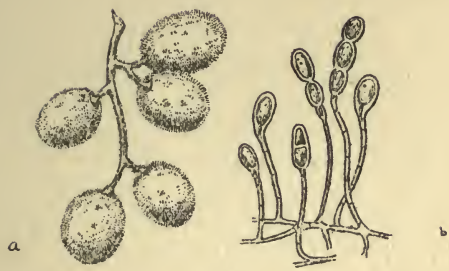
Mildew (*Oidium Tuckeri*).

This is caused by a damp and stagnant atmosphere. It attacks the young leaves and fruit. If not at once arrested it will destroy the crop. It descends from the leaves on to the bunches, which have the appearance of being dusted over with flour. So rapidly does it spread that in a few days it will be on every vine in the house. When it is first noticed apply flowers of sulphur to the leaves, with a distributor, especially on those leaves attacked; or on a fine evening heat the pipes until you cannot hold the hand on them comfortably, then paint them over with a solution of sulphur and sweet milk and a little soot. Given strong firing with judicious ventilation, and a sulphurous atmosphere, the mildew will soon disappear. Fresh slaked lime may also be placed on the borders. There must be no heating of pipes above 130° else the tender foliage will suffer. On no account apply sulphur to hot iron plates, which application is well known to be fatal to vegetable life.

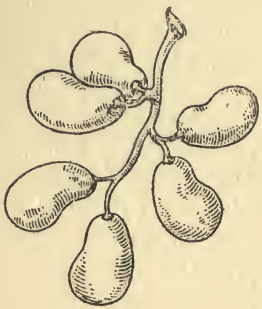
When mildew attacks vines, get your tester and test the border. If found at all dry, give a thorough soaking of water. A liberal supply of water at the roots is as essential as the sulphur in the atmosphere. Mildew can also be checked if taken in time by syringing with soft soap, sulphur and water. To 1½ lbs. sulphur add four gallons boiling water, dissolve well, then add six gallons cold water, and syringe. Let me say here, apply sulphur very cautiously, or you may ruin all your vine foliage by sulphurous fumes.

Rust on the Berries.

There are several causes to account for the appearance of rust. The application of sulphur to the pipes for exterminating mildew is one of them; overheated pipes; cold draughts when the vinery is very hot, or a sudden lowering of the temperature; handling the berries whilst thinning, or rubbing them with the hair whilst working amongst them, are other causes. Rust may be prevented by thus avoiding everything favourable to its production; but it cannot be cured. The affected berries must be cut out. I advise avoiding the



(a) Mildew. (b) Mildew. Oidium Tuckeri. (Magnified).



Scalding.

application of sulphur to the pipes until after stoning, as the skin of the grape is not then so tender, and therefore not so easily injured.

Mrs. Pearson is very difficult to grow on account of its being subject to attacks of rust, as are also Muscats, Frontignan, and Duchess of Buccleuch.

Scalding.

Scalding generally occurs when the berries are about half grown. Just about the time when they are finishing stoning the berries suddenly become depressed on one side and appear as if they had been scalded with hot water. Scalding is not confined to bunches that are exposed to the sun, as many of the bunches are hanging where the sun's rays never touch them. Sometimes it happens that only a few berries here and there are affected. On the other hand a whole house has been known to be destroyed by scalding. In the above case it was that variety known as Lady Downes that was attacked, this grape being subject to scalding. It is caused by too late or improper ventilation. As soon as the first berry is detected the house must be freely ventilated. Never allow the temperature to get low. For Lady Downes I advise a night temperature of 70°, day 80°, until fear of scalding is over. Give a little ventilation day and night. Keep a drier atmosphere. This will prevent moisture being condensed on the berries. At this season the amount of air must be increased quite early in the morning, before the thermometer reaches 75°, and never allow it to run up above 85° even with sun heat, until the atmosphere in the house feels dry. If the vines are in a healthy condition the critical period will be over in 20 days, when all danger of scalding will be past. Varieties most subject to scalding are Lady Downes and Muscat of Alexandria.

Warts on the Leaves.

When warts are noticed on the under sides of the leaves it is evident that the house has been improperly ventilated, for this is caused by a stagnant moisture-laden atmosphere. Many think that warts are quite harmless to the leaves, but

LADY DOWNES.

LIBRARY
OF THE
UNIVERSITY
OF
CALIFORNIA

this is wrong, for leaves badly affected will curl inwards at the margins. These leaves under the influence of the sun turn pale, and ultimately yellow. Warts are not so prevalent in houses which have been freely ventilated ; fresh air and less atmospheric moisture will prevent this evil. An application of sulphur to the pipes will turn every wart black, and show that the vegetable matter is very sensitive to sulphurous fumes. Prevention is thus better than cure, and, as I often say, sometimes our garden cures do much more harm than the disease.

Bleeding.

Bleeding of vines is caused by a strong flow of sap which is exuded from vines when recently pruned. Some growers presume that vines will bleed to death. There is far more stress laid on vine bleeding than there is any call for. There is no doubt that the vine has an immense flow of sap provided the border is moist, having been watered before growth commenced. The sap will flow until it finds an outlet, and here the botanist will remember about the transpiration, respiration, assimilation, and absorption of gases, known as the function of leaves. I am here referring to the drops seen on the apex of leaves when young vines are in the early stages of growth caused by root pressure. Prevent bleeding by pruning long before starting the vines.

Aerial Roots.

Aerial or air roots are produced on the stems of the vine. Canes will sometimes show these aerial roots at every joint. Some think this is a sign of bad health in the vine. It is caused by too close, moist, and warm an atmosphere. If a vine rod was severed from its roots and placed in a close, warm house, with abundance of atmospheric moisture aerial roots will be produced in abundance. There is another cause still by which aerial roots are produced, that is, by allowing the border to become water-logged, or in any way unsuitable for the formation of healthy roots underground, and at a time when the vine with its leaves and growing points, etc., are making a heavy

demand upon the resources of the roots. Lifting and relaying in fresh compost, as described in a previous chapter, is the best remedy if caused by the border. If caused by stagnant atmospheres, then introduce a proper system of heating, damping, and ventilation, which will soon cause the formation of these unwelcome roots to disappear.

Fungus on the Roots.

Fungus on vine roots is not of infrequent occurrence, although it is underground and out of sight. There is a difficulty in dealing with it, especially for the want of knowledge of its existence. Vigorous vines of one season may, the next, have a sickly appearance; and sometimes they will collapse and die. The common cause of fungus on the roots is the mixing of leaves or leaf mould with the compost, which often contains bits of sticks, or even stems or bits of old vine roots left in the borders when previously worked with. When fungus is detected on the roots, remove all the soil containing the white threads. When all this has been cleared away, wash the roots with warm water and sprinkle them with quicklime. Sometimes a good soaking with strong lime water will destroy the fungus. When the border is made up, be very careful not to introduce any sticks or decaying vegetable matter.

Red Spider (*Tetranychus Tetarius*).

Red Spider is the most general and the most troublesome of all insect pests, and one which most vine growers and gardeners generally have to contend with. There are two kinds of red spider. The one most common lives and multiplies on the underside of the leaves. (They live on the Chlorophyl grains—leaf green—found within the cell wall). Here it spins its web, and multiplies with alarming rapidity. It is so small that it can scarcely be seen without the aid of a magnifying glass. The other species is found on the upper side of the leaves. It is larger in size and brighter in colour than the first, and easily detected by the naked eye. The experienced

cultivator will soon detect the presence of spider by the brownish appearance of the leaves. It is often found in dry corners and near the hot water pipes. As already said, it multiplies rapidly, and if not immediately dealt with will attack the bunches and retard or cripple the crop for the season. I will now endeavour to explain how to destroy this pest. On the first appearance of red spider, sponge the leaves with warm, soapy water. Although this is rather a tedious and slow process, it has never failed to destroy this enemy. After sponging, give the vines a good watering at the roots; keep the atmosphere of the house charged with moisture, especially if the temperature be high. If proper attention be given to ventilation and the vines not allowed to suffer from want of water at the roots, red spider need not be feared. Besides the sponging I have recommended, I also advise syringing with clean rain water. Be careful to use no other, or you will damage the fruit. If the water is free from calcareous matter, however, there is little fear of disfiguring the berries. If neither sponging nor syringing has eradicated the spider, the last remedy must then be resorted to, viz., a mixture of sulphur, soft soap and milk, and painted on to the pipes when they are hot.

Thrip (*Thrips Minutissima*).

Thrip is sometimes troublesome, especially if Azaleas and other plants are kept in the vineries. This is a long, slender insect, colour dark brown, at times almost black. It feeds upon the vine leaves in the same manner as spider, rejoicing in a high, dry atmosphere. If permitted to obtain a footing its ravages are severer even than spider. Never allow them to establish themselves. Take them in time, and sponge the leaves with tobacco water, soap and sulphur; or to be more convenient, use Gishurst Compound—this will doubtless destroy it. The most effective remedy, however, is to fumigate lightly with XL ALL, and repeat every eight or twelve days. This is a most effective cure and will destroy all larvæ advancing into an active state of life.

Mealy Bug (*Dactylopius adonidum*).

This is an insect which is becoming very prevalent in vineries. It is of foreign introduction, and now quite at home in our plant houses. The white, mealy substance from which it is named is almost proof against water. It instantly melts when drenched with methylated spirits. When once it is produced it spreads rapidly from the branches to the bunches, and when on the latter, cannot be destroyed without damaging the fruit. As the season advances, the genial warmth of the vineries will draw them out of their winter quarters, which often are under the back of the vine. The best way to destroy them is to touch them with a camel hair brush, dipped in methylated spirits. This causes instant death, and therefore, proved to be a most effectual remedy for mealy-bug. Also fumigate the house with XL ALL three or four times in succession after the fruit is cut. As a winter dressing for vines infested with mealy bug, paint the canes with gas tar mixed with half a peck of dry clay and half a peck of lime, to half a pint of the tar; mix thoroughly by placing on a fire and adding as much water as will make the whole about the consistency of thick cream. Apply when cold.

The most harmless for all remedies for bug is to scrub the vines well with warm water and a little soft soap, and dress them every day for a week with Gishurst Compound. Paint the houses, first having them well washed. Limewash the walls, using hot lime. Remove one inch from the whole of the surface of border. But it may take even a year or two to rid the vineries of this dreaded foe.

The Vine Weavel (*Otiorhinchus Sulcatus*).

This weavel is not very common, but sometimes it does a great deal of mischief before it is noticed. It comes out of its hiding place during the night and eats through the yonug leaves and growing points of vines, and thus greatly cripples their growth. The shoots thus damaged should at once be cut back to the sound part. The best way to destroy them is to go quietly into the vinery at night and spread a white paper

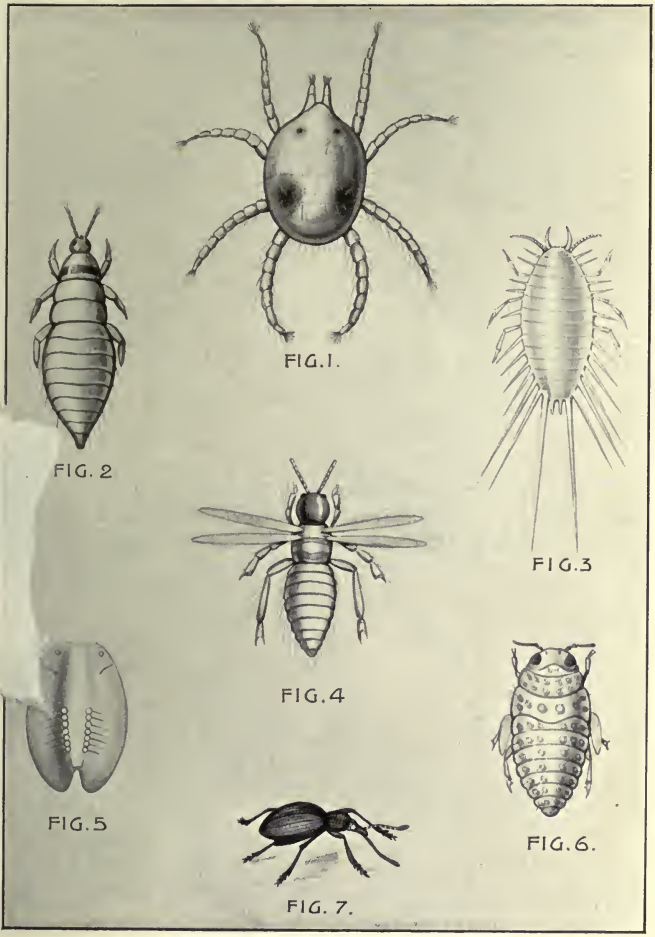


FIG. 1.

FIG. 2

FIG. 3

FIG. 4

FIG. 5

FIG. 6.

FIG. 7.

LIBRARY
OF THE
UNIVERSITY
OF
CALIFORNIA

under the vine where they are likely to be at work. Give the rod a sharp rap with the hand, when they will fall upon the paper and are readily captured and killed.

Vine Scale (*Pulvinaria Vitis*).

This insect is not often met with, but when it does obtain a footing it is very difficult to get rid of. If not made war against at once, it will extend all over the canes. Vine scale is detected by the cottony exudations which denote its presence. This is the dried up body of the scale and full of eggs, which will hatch the first fine days of spring. If not taken in time it will extend from the wood to the leaves, thence to the fruit. The best way to get rid of this pest is to thoroughly scrub the vines in winter with Gishurst Compound, or even soft soap and hot water will do. The vines should be carefully looked over once a week during summer for scale.

Vine Louse.

This Vine Louse (*Phylloxera Vastatrix*) is of continental origin, and I consider it the most dreaded of all foreign pests with which the grape grower has to contend. The insect, when fully developed, is of a yellowish, brown colour, and very transparent, so that the eggs can be seen, these being also transparent. It has been illustrated at different stages of development. This Phylloxera first attacks the roots of the vine, and eventually works its way to the stem. It eats the inner bark of the roots. When examined under a strong microscope the roots appear as if surrounded by a swarm of bees. As this insect, like many others, multiplies very quickly and by the thousand, they are capable of destroying a healthy vine in a month. There is no remedy known except flooding the borders. Grafting on the American vine has also been recommended ; but in most cases the vines will require to be lifted and burned. Next remove the soil in which they were growing ; cleanse the houses and paint them ; limewash the walls ; cleanse and scald every part of the border, then make up and re-plant. It is an acknowledged fact that this insect prefers a warm, dry inside border ; and it is noticeable that

PHYLLOXERA.

(*a*) Infested Root, showing Knots and Swellings caused by the Lice.

(*b*)

Healthy Root.

Vine-leaf infested with Phylloxera, forming small galls on leaf.

where the Phylloxera abounds, it abounds most in the driest parts of the border. This proves that vine borders must never be allowed to become very dry at any time.

There is one consolation, and that is, that Phylloxera will not breed on the roots of other plants. It is indigenous to the vine. In conclusion I must state that it is the duty of every gardener to immediately dig up and burn his vines if, unfortunately, attacked with Phylloxera Vastatrix.

CHAPTER XXIV.

PROPAGATION.

Seed.

In describing the many methods of propagating the vine, let me begin with the seed. The method of raising vines from seed, however, is not often practised. Unless the flowers from which the seed has been produced has been cross-fertilised, they invariably reproduce themselves and are thus of little value. Presuming that the seed is worth sowing, having been collected in August or September, sow at once in pots or pans of sand and loam; plunge the pots in a propagating pit with 80° bottom heat. If sown in pans, pot them off as soon as they can be handled. Replunge them where they were. For Spring sowing, keep the fruit until time of sowing, then gather and sow; and middle of February will do for this. When kept, the seed of the grape loses its vitality. The seedlings must just be grown on steadily until ready for the vine border.

Cuttings.

Most know what a cutting is, so that will need little description. The vine cuttings are made of well-ripened wood, having four or five eyes, with a heel of the old wood. They are

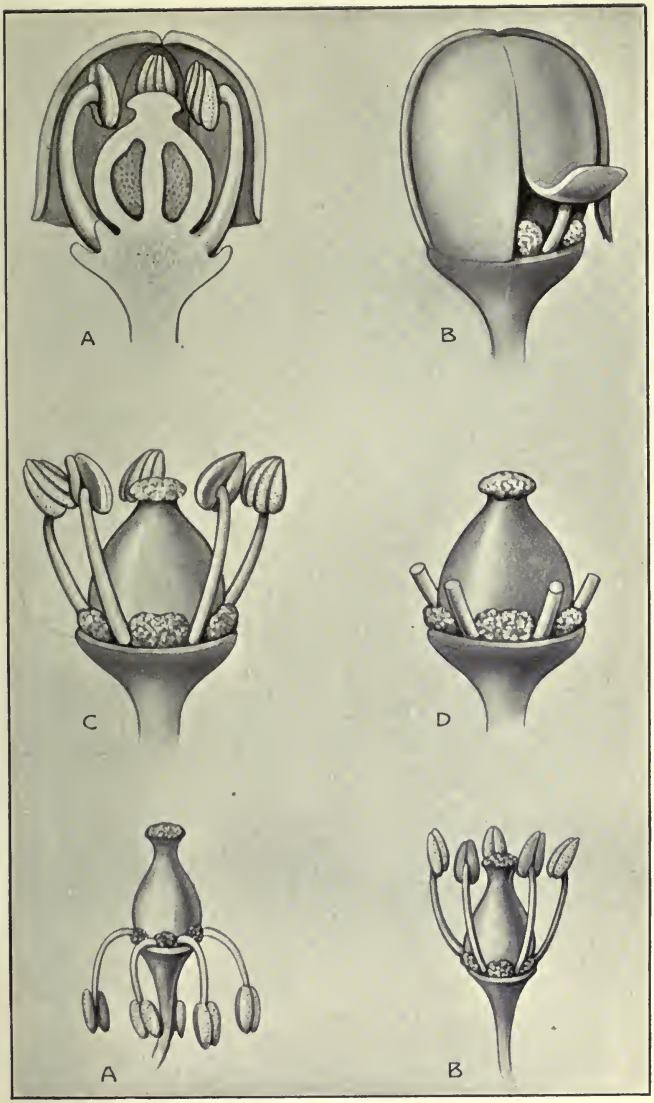
taken off when pruning the vines, or when about to propagate. Plunge them when inserted in small pots in bottom heat of 80° as advised for seeds. This is a good method of propagation when young vines are required for planting against south walls in the southern parts of Britain and other warm climates. Plants raised in this way will not make good vines for planting in vineries, and should never be so used. The reason of this is because the cuttings become bark-bound, and this hinders the flow of sap when they commence to root and grow freely.

Propagation from eyes.

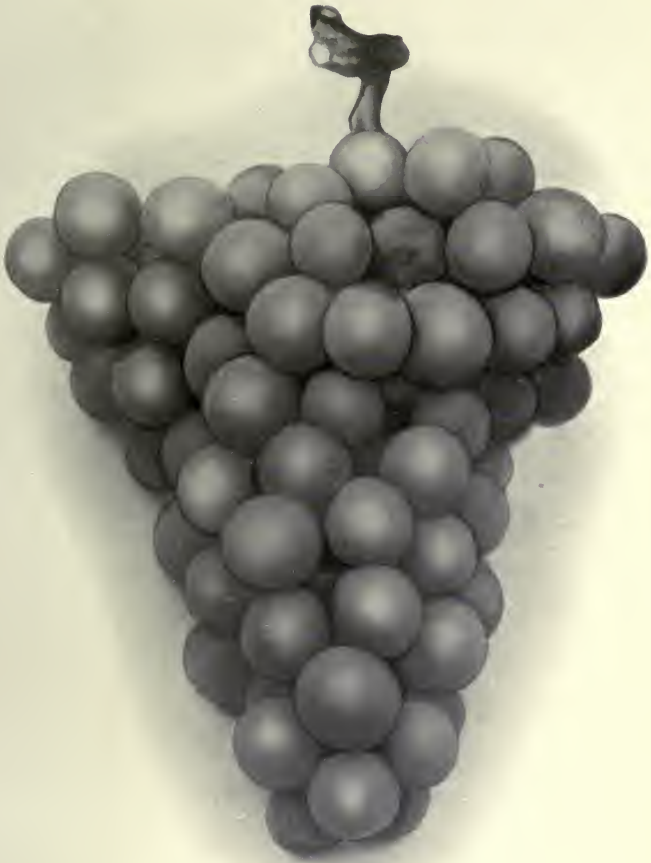
This is the method of propagation most generally adopted. When pruning the vines in winter, select, label, and tie up carefully all varieties you wish to propagate, taking care to select well matured wood for propagating. Select wood with prominent buds and prepare as in illustration. Use a sharp knife and place in 2½-inch pots filled with loam, using sharp sand to place the eye on. Cover with a little loam and allow the bud only to be seen. Place in a cool house or frame for about ten days before bringing into heat, when they should be plunged into 70° to 75° bottom heat. The temperature of the house should be: night, 60° to 65°; day, 70° to 80°. As soon as the roots touch the sides of the pots, re-pot into a larger size, about 3½-inch, using nothing but good turf. Grow them on in the same temperature until ready for planting out into the vine border; or they may be grown in 9-inch pots for fruiting canes.

Striking Vines in Turfs.

This method of raising vines is to be preferred when planting into borders. Cut turves from a green pasture, 14 inches square. Lay each turf grass side down on a hotbed, or place them in propagating boxes or trays. See that they have plenty of bottom heat. Cut a little piece out of the turf for the reception of the eyes, at a distance of four to six inches all over the surface of the turf. Place a vine eye in each hole. Cover with a little loam and sharp sand. Give a good watering all over to settle the soil, and keep the pit or hot-bed cool for



FLOWER OF THE GRAPE VINE.



DUKE OF BUCCLEUCH.

LIBRARY
OF THE
UNIVERSITY
OF
CALIFORNIA

twelve days, afterwards turning on the heat. Keep the house close; temperature 80° to 85° by day; 65° to 70° at night. They will soon root and begin to grow, and as the day lengthens the young plant strengthens, and will soon be ready for planting in their permanent positions in the borders, or will make splendid canes if potted on by the end of the season.

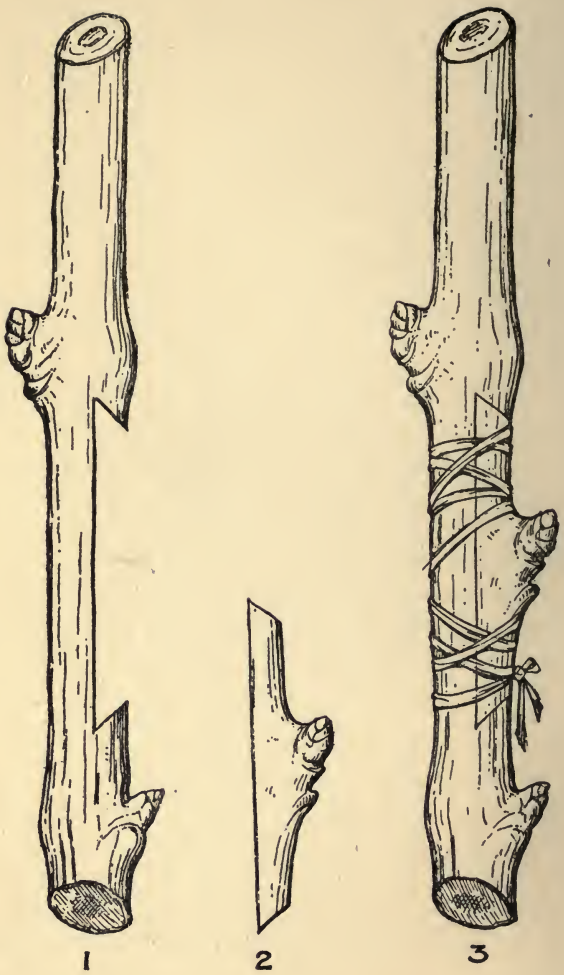
Grafting.

My favourite method is what is known as dove-tail grafting, and I think it is best explained by the illustration. Bottle grafting used to be much practised. It is a sure way of getting a good union. Grafting differs from inarching, as it consists of placing ripe wood to ripe wood. Most of my Muscats are on Gros Colman Stock; Duke of Buccleuch on Trebbiano; Directeur Tisserand on Alnwick Seedling; Muscat Hamburg on Black Alicant; Chasselas Napoleon on Foster's Seedling; Duke of Buccleuch, again, on Barbarosa.

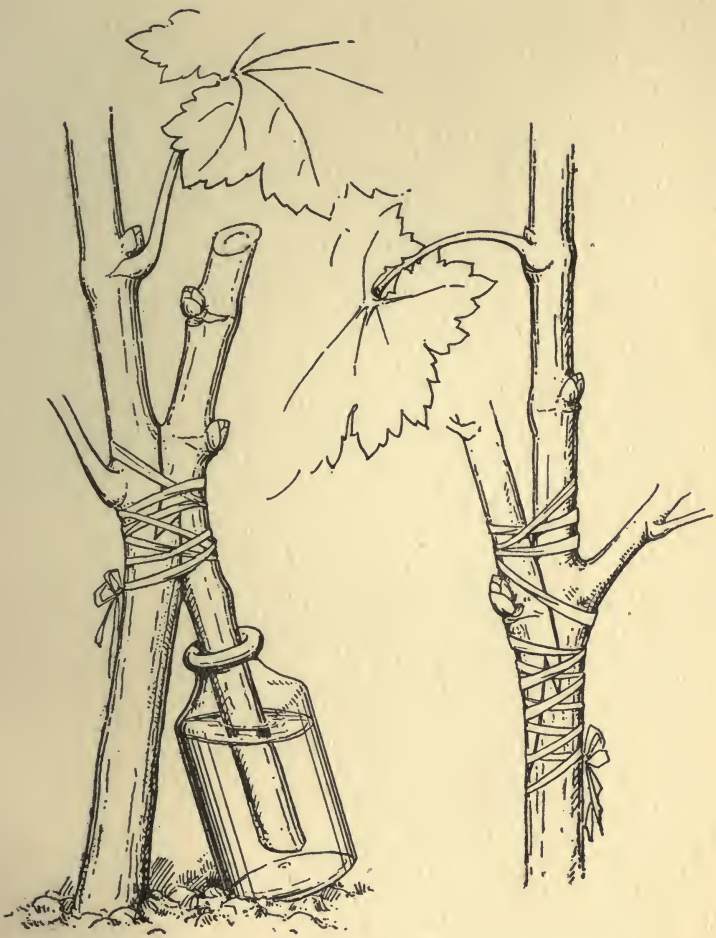
Although I would in nowise lay down rules for stocks to graft on, for many vines, given the treatment that suits them, will finish best on their own roots. This year (1906) in the eight bunches with which I secured the trophy, my Muscats were on their own roots and the latter all in inside borders. Time to graft is when the sap begins to flow in spring, when the stock has made growth about four inches in length.

Inarching.

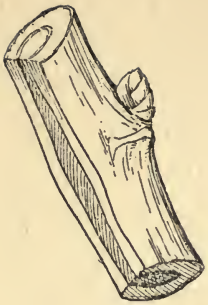
Inarching is another favourite method and can be simply done. It has an advantage over grafting in that it is supported by the parent vine until a proper union of stock and scion has taken place. It is performed by placing two growing shoots of about the same thickness together, after first having cut a piece off the side of each and having both cuts fitted nicely together and then binding with raffia. In grafting and inarching the cumbium of stock and scion must be placed together. When a union has taken place the scion may, if desired, be severed from the old stock. In this way many different varieties may be grown on the same stock. When there is a supply of new varieties in pots they can readily be



Showing Method of Dovetail Grafting.

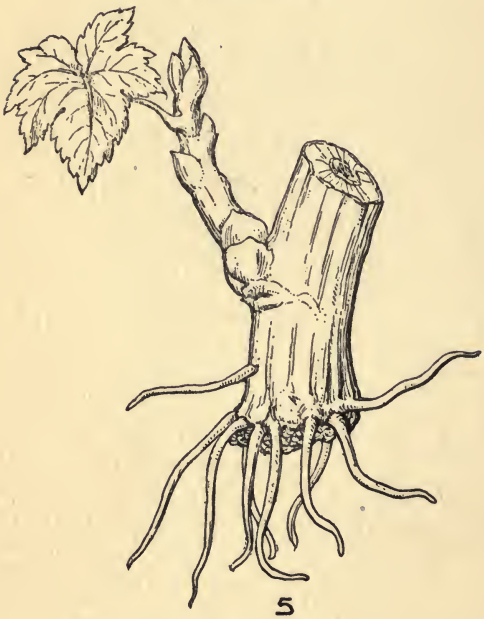


Bottle Graft. Whip Graft.



4

Dormant Eye.



5

Vine Eye started.

6

Vine Cutting showing lower Eye removed.

INARCHING.

inarched to established canes, and will bear the following year. Great care must be taken that these are not broken off in winter when the houses are being cleansed.

CHAPTER XXV.

Fruiting Canes for Pots.

Great care must be taken in preparing the compost for finally potting the fruiting canes into. The compost should consist of good, fibry loam. A liberal addition of vine and plant food (coarse grade); a little burnt clay and lime rubbish. Pot firmly, place in bottom heat to give them a start. When they have begun to grow, raise the pots out of the bottom heat; let them stand on the surface of the bed they were plunged into until they require more head room. When watering use tepid water. As soon as the pots are fairly full of roots, supply them with liquid manure—I cannot recommend better than what I always use: the fine grade of Kirk's Vine and Plant Food, half-an-ounce to 1 gallon of tepid water once a week. Syringe over head every afternoon and close the house early. Temperature: day, 80° to 85°; night, 65° to 70°. Pinch all laterals at first leaf. Also pinch the leader when 5 feet in length, and allow it to grow no higher. After fruit is gathered throw out the canes, having a young batch to take their places, struck from eyes.

CHAPTER XXVI.

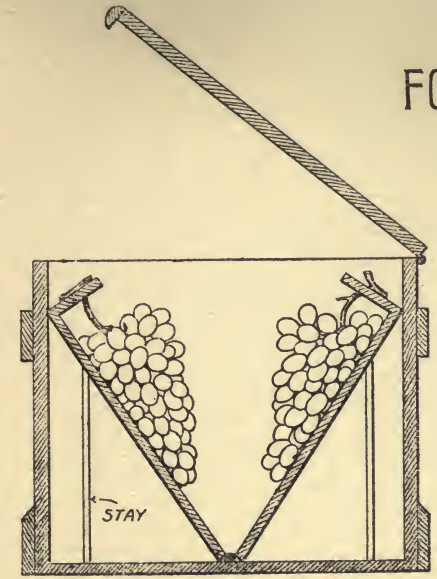
Exhibiting.

The man who desires to become a successful vine grower and exhibitor will require to have a knowledge of how a bunch of grapes should be coloured and finished, also the symmetry of bunch and size of berry; have an expert eye for detecting good

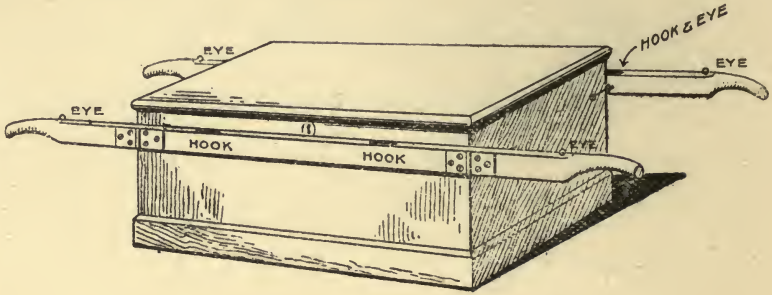
GRAPE BOX
FOR 8 BUNCHES OF GRAPES.

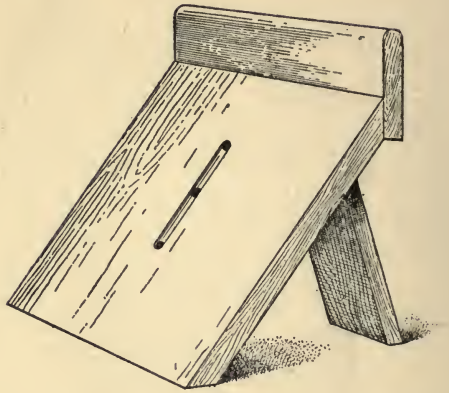
· DIMENSIONS ·

LENGTH	42" OVER	HANDLES	18" OVER
BREADTH	21" "	HINGES	6" "
DEPTH	18" "	LID	42½ "

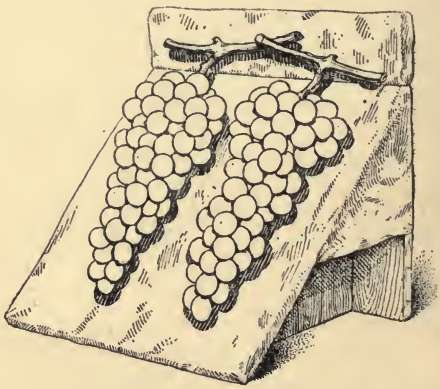


· SECTION · THRO · BOX ·





Mr. Kirk's Show Board.
Length, 15½ in.; Breadth, 9½ in.; Depth of Projection, 2½ in.



Show Board recommended by some growers with Grapes suspended from top.

and bad points in a bunch. He must be very careful in cutting down his bunches, placing them on the boards with the best side facing the judges. This work really requires great care, and must be done properly, as they have often to travel long distances, where they are to be staged without spot or blemish. My first experience was in 1878, when I took grapes from Kirkcudbrightshire to the Crystal Palace—a distance of over 300 miles. These were boarded two and four bunches on a board, which is a very bad system, not travelling at all to my satisfaction.

The following year I boarded all my grapes on single boards, that is, one bunch to the board, carried them to Newcastle show and staged them there without spot or blemish. Ever since then I have always used single boards, which are a great advantage over the old system. They are also much easier placed on single boards, as you can get round about them as you wish.

The illustration will show the kind of boards I use, about 15 inches in height, and 10 inches broad. Place sharp pegs in the bottom of the stands to avoid slipping on exhibition table or in chest. Place a piece of cotton wool over the board, cover this very neatly with white cotton cloth and tack at the back. This is far superior to white paper. Have two holes in the board to pass your string through, which is to fix the bunch, or rather, keep it in position. A screw should be driven in at the back to fasten the string to, from which hangs your bunch. Have in two or three strong tacks, to be used for fastening wires to. We will now presume that the bunches are thus placed on the boards ; then place these again carefully in your box, made to hold eight boards, which is a very convenient size. They must be carried very carefully to station and placed longitudinally in the van.

In 1894 I again carried grapes to the Crystal Palace on single boards. This time I went from Clackmannanshire, a distance of over 350 miles. You must not be above spending a night in the van along with your boxes, or get excited when a midnight change is to take place on a crowded platform.

Just keep a sharp eye on your boxes and see that they do not get turned upside down, and see that they are again placed longitudinally in the van. Of course you will have painted on the top of your box the words—

"FRUIT.

TO BE KEPT LEVEL."

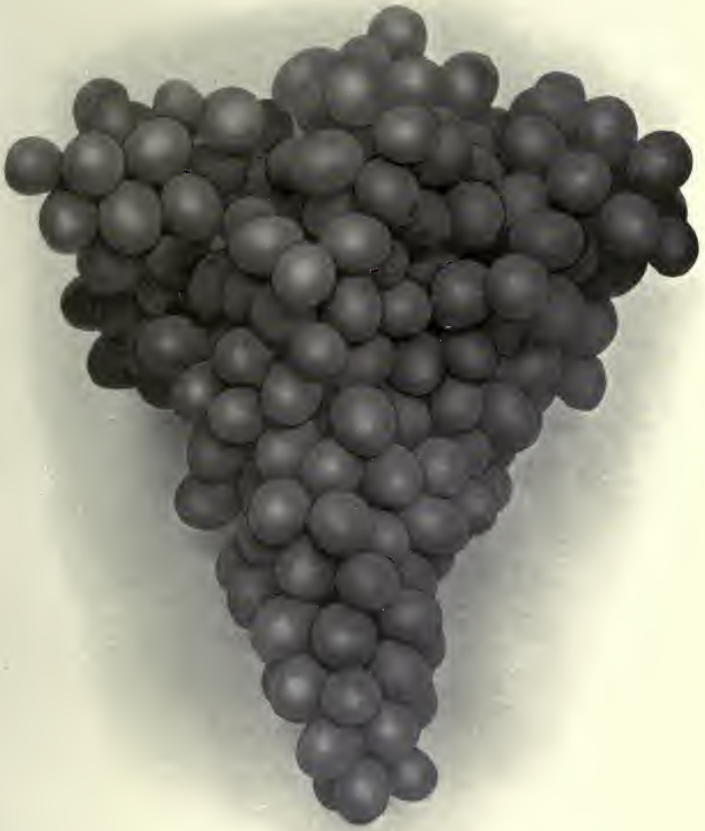
In 1894, at the Crystal Palace Show that I above referred to, I was greatly complimented by gardeners and visitors when I placed spotless examples on the exhibition table; but little did they think of the care and anxiety it cost me to take them so far without spot or blemish. It may be interesting to quote an extract from the *Gardeners' Magazine* of October 6th, 1894, regarding my exhibits:—"One of the most noteworthy exhibits in the show came from north of the Tweed. A set of 12 bunches grapes, grown by Mr. A. Kirk, gardener to J. Thomson Paton, Esq., Norwood, Alloa. This was an easy first in its class. So well developed in size of bunch, colour and size of berry, and general finish, that we have had it specially photographed and illustrated in the present issue. The bloom on Gros Maroc was only equalled by the marvellous colour and size of berry of Madresfield Court. The bunches of Black Hamburgh were large and nicely finished. Duke of Buccleuch, the remarkable and magnificent white grape, was represented by two large bunches which attracted much attention. Muscat of Alexandria and Mrs. Pearson were the other two white varieties staged. We must compliment Mr. Kirk on his complete success." In 1895 I took grapes from Scotland to Dublin by steamer, and this was an easy task, and I much preferred it to the rail.

When all the grapes intended for exhibiting have been placed on the boards, place one by one in the boxes—the more upright they are in the boxes the better, if properly tied to the boards. All grapes that have a distance to travel must be very firmly tied, a piece of the cane always being cut along with the bunch for this purpose.

Top Row—1 MADRESFIELD COURT. 2 BLACK HAMBURG. 3 BLACK ALICANTE. 4 ALNWICK SEEDLING.
Middle—1 & 2 BLACK HAMBURG. 3 & 4 MADRESFIELD COURT. 5 & 6 COOPER'S BLACK.
Bottom—1 & 2 MADRESFIELD COURT. 3 & 4 BLACK HAMBURG. 5 & 6 GROS MAROC. 7 & 8 ALNWICK SEEDLING.

Two Firsts, One Second, Edinburgh International Show, 1891.

ALNWICK SEEDLING.



BLACK ALICANTE.

CHAPTER XXVII.

Varieties.

Alnwick Seedling.—A handsome grape, with a very black berry, good habit, but not always setting freely. It was sent out in 1876 by Mr. Bell, of Clive House; raised at Alnwick Castle; always colours jet black; second-rate in quality. A grand exhibition grape.

Black Alicante is a handsome, black grape of easy culitvation; second-rate in quality, late, just coming in before Gros Colman. Useful for exhibition.

Black Hamburgh.—One of the best grapes in cultivation; well-known and very popular among grapes; for early or general work; easily grown and first-rate in quality. For exhibiting it is first-class, and one of the best black grapes in cultivation.

The following varieties are synonymous :—

Mill Hill Hamburgh.
Victoria H.
Champion Hamburgh.

Black Maroc.—A fine old variety when well grown. A good winter grape, generally a bad setter, and seldom seen on an exhibition table; quality, third-rate.

Buckland Sweetwater.—An early grape, succeeding well with Black Hamburgh. Succeeds best when pruned on the long spur system; quality second-rate. When well finished the berries have a rich, golden colour. This is a good variety for exhibiting.

Black Prince is an old variety, free setter, seldom grown, and little good for exhibition; quality only third-rate.

Cannon Hall Muscat.—This is quite distinct from Muscat of Alexandria; large, round berry with real Muscat flavour. It is a gross grower, but shy setter, rather difficult to grow, but when perfectly finished is one of the best for exhibition.

Duke of Buccleuch.—This is another gross grower, and a very early variety, and of first-class quality. It requires to be grown on the long spur system. (*See Pruning*). When well grown it is not easily beaten. It should come next to Muscat of Alexandria; and no other White, in my opinion, comes nearer in value to Muscat of Alexandria than Duke of Buccleuch, consequently, splendid for the exhibition table.

Duchess of Buccleuch.—A white grape; flavour highly Muscat; quality first-rate, but on account of its small berries it is seldom grown; a shy setter. It is seldom exhibited except for flavour competitions.

Foster's Seedling.—A white grape of second-rate quality. It is an early variety and invaluable for forcing; succeeds best with Black Hamburghs. It is of very little account as an exhibition grape, and seldom exhibited.

Gros Guillaume, syn. with Barbarosa (black).—Is a strong grower and requires to be pruned on the long spur system. Quality only third-rate. It has borne bunches 15 to 22 lbs. weight, and it is only in this respect it is of any use for exhibition. It is a late variety, the fruit keeping well into spring if properly ripened.

Gros Maroc, syn. Cooper's Black.—A black grape; quality second-rate; of strong-growing and free fruiting habit. The bunches have a very handsome appearance. The berries will swell to a very large size if properly thinned. It finishes in late autumn, and is not a good keeper. It is one of the best grapes in cultivation for shewing at exhibitions, and is often seen on every stand.

Golden Hamburgh.—Syn. with Buckland Sweetwater.

Golden Champion.—Syn. with Duke of Buccleuch.

Lady Downes (black and white varieties).—The white is a very inferior grape, and not worthy of cultivation or description. The Black Lady Downes again is a grand grape for winter use. The fruit will keep fresh and plump till summer in a good fruit room. This may seem like exaggeration, but, as this is written on the 6th of June, let me say that I have

BLACK HAMBURGH

MUSCAT OF ALEXANDRIA.

still grapes in the fruit room. They were cut about the end of December, I think. Lady Downes requires a long season of growth, and a high temperature to set its fruit. Treat same as Muscats while in flower. It is very susceptible to scalding of the berry. When the first sign of colouring begins, stop all damping. Maintain a very steady temperature day and night, with air.

Muscat of Alexandria.—This is the best and most handsome white grape in cultivation. The vine is a good grower, and will set well if given a high, dry temperature when in flower. The difficulty is that as it requires a long season it is early started, and has to be given those high temperatures, while outside we may be having 14 degrees of frost. When properly ripened and finished it is of a bright amber colour, and certainly worthy of praise as one of our best late grapes. It is one that takes the highest number of points on the exhibition table.

Muscat (Tinningham).—Syn. with Muscat of Alexandria.

Bowood Muscat.—Syn. with Muscat of Alexandria.

Madresfield Court (Black Muscat).—This is one of the best black grapes, and without doubt the most handsome. It is a free setter, and succeeds well under cool treatment, and grows well with Black Hamburgh. It is an early and mid-season variety, but no good for keeping. The berries are subject to cracking if too much moisture be in the house. It is an excellent black for competition. The danger of cracking is when colouring begins.

Mrs. Pince.—This is another black Muscat, of very fine flavour, and of first-class quality. Being a late grape, it takes a long time to ripen its fruit. The bunches grow to a large size. It is splendid for long keeping qualities, keeping plump and fresh until the end of April.

Mrs. Pearson is a white, with Muscat flavour of superior quality. The vine is of strong growing nature and sets freely. It requires quite as long a season as Muscat of Alexandria. When well finished it will keep fresh and plump for a long season, being one of the latest and best of white grapes.

Muscat Hamburgh (Syn. with Venos Seedling).—This is a black grape of strong Muscat flavour. When well grown it is one of the best, and is often known as Black Muscat; valuable for exhibition; a midseason grape, but will keep well when ripe. It is rather a shy setter, and is best fertilised with Black Hamburgh's pollen, and best grafted on Black Hamburgh.

Raisin De Calabre (Syn. with Trebianno).—A white grape of second-rate quality; very useful for late keeping purposes. I believe it will produce larger bunches than any other white in cultivation. The vine is a gross grower. It is useful for competition in the heaviest bunch class. Mr. Curror, of Eastbank, in 1875, exhibited a bunch of the variety weighing 26 lbs. 4 ozs.

Royal Muscadine.—A round, white, Sweetwater grape of excellent quality; will do well in Hamburgh house. It keeps well when ripe; is a useful grape for amateurs, as it succeeds well in a greenhouse, and is suitable for pot culture.

White Neice and Syrian are both coarse grapes and seldom grown, except for size. The one so much resembles the other that I am of opinion they are synonymous. Mr. Fowler produced bunches of these grapes weighing 17 lbs.

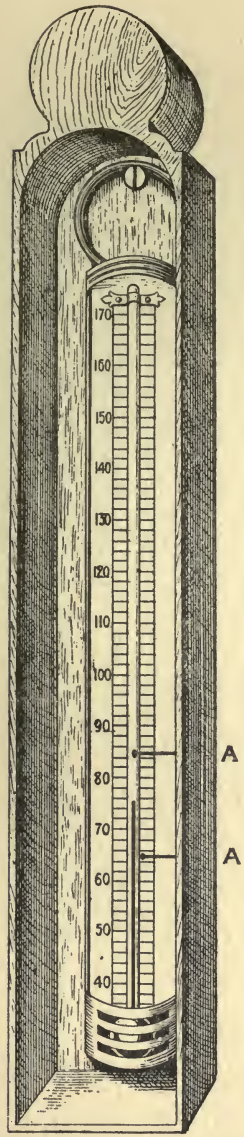
White Frontigan is something similar. I grow most of these varieties, that are not qualified for exhibiting, on the back walls of my vineries, and I would advise others to do likewise.

CHAPTER XXVIII.

Storing.

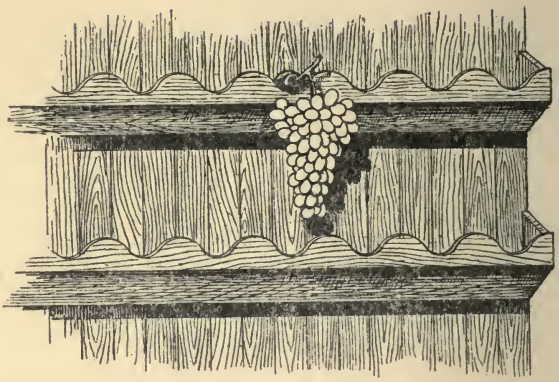
Most grapes should be cut about the New Year. Cut a piece of the branch with each bunch, first tying a piece of string on it to secure it to a rake handle, on which many bunches may be carried to the fruit room at a time. See that they do not rub against each other when carrying. Have ready a number of bottles filled with clean water, and place the stem well down in the bottle, and place on the rack. Avoid wetting the grapes,

MADRESFIELD COURT.

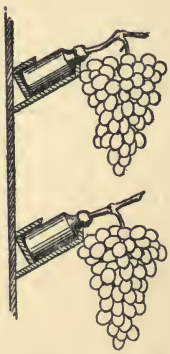


Thermometer in Wooden Case.

Depth of Case, $1\frac{3}{4}$ in. The parts marked A A represent Pins used to show how temperature is regulated.



Front View of Fruit Rack



Side View of Fruit Rack.

CHASSELAS NAPOLEON.

and see that they hang clear of each other. Keep all the varieties separate and use the worst keepers first. Keep the room dry, clean, airy and dark, and by all means keep out frost. Examine the grapes continually and cut out any decaying berries and see which varieties are keeping best.

CHAPTER XXIX.

On New Varieties worthy of Cultivation.

Appley Towers is a splendid grape of high merit for exhibition. It resembles Black Alicante, but takes on a better bloom; quality third-rate; good for exhibition purposes; sent out in 1889.

Chasselas Napoleon.—A white grape, strong grower, and takes on a fine golden colour when grown on its own roots. A first-class grape when properly finished, and fine for exhibiting; sent out in 1892.

Diamond Jubilee, black.—A very gross grower, and has large berries, which take on a fine bloom. Coarse flavour; free setter.

Directeur Tissirand, black.—This is a remarkably fine new grape; a fair setter; bunches of fine form. When well finished it is a most beautiful grape; berry round and fair-sized. One of the best keepers in cultivation, and a useful grape for winter use; second-rate in quality, but has a fine appearance when highly coloured. A grand exhibition grape; sent out in 1897.

Lady Hutte.—This is one of the best white late keeping grapes in cultivation. I wrote about this in the *Gardeners' Chronicle* in 1904. It is of no value for exhibiting; not difficult to grow; naturally assumes a greenish hue; quality first-rate. It should be in every collection. Sent out in 1890.

Mrs. Pearson is a white grape, with a very high Muscat flavour; free grower. When properly finished it takes on a beautiful golden colour; is a first-class grape, but subject to rust. Sent out in 1874; already described on page 65.

CHAPTER XXX.

On Raising New Varieties from Seed.

This is rather an interesting operation. Select the bunch you wish to cross-fertilise. Clip away the flowers all but three or four that are not yet in bloom ; take off the capsule as soon as it will come without damaging the remainder of the flower. Remove the stamens, and, having collected the pollen from your choice male parent, place it on the stigma with a camel hair brush or such like instrument. Cover with tiffany to prevent any other pollen coming into contact. Repeat this operation of pollination about three times and your berries will soon begin to swell. When ripe, gather and sow. (See Chapter on propagation). It is best to let the seed remain in the fruit till November, and then clean and keep in sand until spring, or sow in pans when gathered.

CHAPTER XXXI.

Judging.

Any expert grape grower who has distinguished himself at the leading exhibitions is, without doubt, capable of judging grapes, either by new or old methods. The latter is simply by placing the prize card on the exhibit. This is what I call "please the eye system" of judging, and may do for single or double bunches, but not for collections. When collections consist of 6, 8 or 12 bunches, and in such there may be seven or eight competitors, the best possible method of judging is essential. And here again I emphasise what I have already said, that a judge must needs himself be an expert grower and successful exhibitor. Imagine anyone growing grapes with months of ceaseless care and attention, and staging them, to be judged by unqualified judges. Now, in judging collections, the first thing to do is to go over each collection, commencing with Muscat of Alexandria, giving the maximum and minimum number of points to each bunch respectively in all

DIRECTEUR TISSERAND.

LADY HUTTE.

the collections. Next in merit comes Madresfield Court. Proceed with this variety, going over each collection again and awarding the merited number of points to each bunch, and so on until all are thus rightly judged. Black Hamburgh, Muscat Hamburgh, and Mrs. Pince, etc., are all reckoned equivalent to Madresfield Court. Every bunch in each prize collection should have the number of points it has secured attached to it. A card on which is printed the maximum number of points for each variety having the number it secures placed on it, is a good system, and one which will become general at all the leading exhibitions. I strongly advise judges to be very careful and place bunch to bunch in each collection before awarding the points. For instance, it sometimes happens that, say, a bunch of Black Hamburgh at the one end of the table is awarded 8½ points, and a bunch of the same variety at the other end is awarded 7½ points. Compare the two bunches side by side, and you will see at once if awards are correct. A judge must be capable of spotting the bad points as well as the good. A perfect bunch should be well coloured with a dense, spotless bloom; berries large and uniform in size; perfect in shape; perfectly thinned; bunch compact and firm.

Large loose bunches having berries of various size, spotted, rubbed, shanked, mildew, rust, insect effects, are all defects that judges must be careful not to overlook, being careful to arrive at the correct value of each bunch before awarding the points.

My Code of Rules.—The first point to consider is colour—possible points 2. Next, finish or bloom—points 2. Third first-class quality—possible points 3, as Muscat of Alexandria. Fourth, size and symmetry of bunch—possible 1½. Fifth, perfectly thinned, with large berries—possible 1½.

In all cases I would give second quality two points and third one point. Thus, Muscat of Alexandria would secure a maximum number of ten points. Black Hamburgh and all other Muscats nine points. All other varieties maximum eight points.

CHAPTER XXXII.

A New System which I advocate when erecting new vineries or re-planting old ones

is to build a single brick wall between each vine. This may seem superfluous and may be condemned by many, but I believe it is really necessary; and I would myself adopt this system which I have in my mind. By adopting this method—that of having a single brick wall separating every vine, and thus confining it to its own allotted space—you have many advantages.

The brick wall, of course, must be founded on the concrete beneath the drainage and upwards to the level of border, about 2 ft. 6 in. The walls should be 3 ft. 6 in. apart, and the whole is simple enough. Each wall must be built both inside and outside the vineries. Here each vine can have its own special treatment as regards watering, feeding, lifting and relaying roots, root-pruning, or removing altogether and planting another, all without disturbing any of the roots of the others. You have all under your own control, and this is necessary, especially in houses containing many different varieties. You may work vineries to perfection as regards airing and heating; but if the roots are beyond your control your work may be in vain. The great secret in plant-growing is in watering—to know when to give and when to withhold. Now-a-days there are a great many varieties of grapes, and many may be grown in the same vinery. Some of these varieties succeed well with plenty of water at the roots and some will not. The old system of drenching a vine border with water from end to end, may be a benefit to some and not to others, which it may start into a second growth and thus never finish their crop. I have proved that many of the best varieties can be grown in the same house with the same temperature and atmospheric conditions, but not with the same treatment at the roots in watering.

My experience of 35 years has convinced me that this system of having an allotted space for each vine is the right one. I have growing in one house from eight to ten varieties of grapes, under the same atmospheric conditions; some are supplied with water when others are not; some are thinned when others are in flower, and some are fit for use when others are not. Then, as all vine borders should be made up by adding additional sections every two or three years, according as the roots fill and permeate the old, each vine can be thus supplied according to its requirements.

LIBRARY
OF THE
UNIVERSITY
OF

	PAGE.
Aerated Borders	12
Air	35, 36
Alnwick Seedling	63
Appley Towers	69
Berries, regulating	29
,, small, stoneless	29
,, transparent	31
Black Alicante	63
Black Hamburgh	20, 63
Black Maroc	63
Black Prince	63
Bleeding of Vines	45
Bloom	52
Bones, ½ inch	14
Borders, concreted	14
,, depth of	14
,, making up of	14, 15
,, adding to	14
,, outside	15
,, watering	15
,, tester	16, 17
,, renovating soured	37
,, ,, time for	37
Bowood Muscat	65
Buckland Sweetwater	63
Buds	16
Bunches, curved	28
,, double pointed	28
,, one sided	28
,, shoulders of	29
,, thinning of	29
,, handling	42
,, twenty-two lbs.	64
,, twenty-six lbs.	66
,, comparing	71
,, bad points	71
,, large and loose	71
,, compact	31, 71
,, colour of	31, 36
,, finish of	71
,, bloom on	36, 71
,, quality of	37
,, size, symmetry	58, 71
Cannon Hill Muscat	63
Carriage of Fruit	62
Chasselas Napoleon	69
Colouring	31, 36
Cooper's Black	64
Cross fertilising	51, 70
Cuttings	51, 52
Damping down	16
Diamond Jubilee	69
Directeur Tisserand	69
Disbudding	21
Diseases	40—51
Drainage	12
Draughts, avoid cold	29
Duchess of Buccleuch	44, 64
Duke of Buccleuch	13, 64
Early Vinery	6
Erecting Vineries, new system	72, 73
Exhibiting	58—62
Eyes, Propagation	Introduction
Feeding	14
Flowering of Vines	52
Forcing	34
Foster's Seedling	64
Gishurst Compound	17, 47
Golden Champion	64
Golden Hamburgh	64
Grafting	53
Grapes at Crystal Palace	61
Grapes, boarding of	61
,, on single boards	61
,, preparing boards for	61
,, for travelling	61
,, box in van with	61
,, packing for show	61
,, cracking	65
Gros Guillaume	64
Gros Maroc	64
Half-Span Vinery	7
Hamburgh (Mill Hill)	63
Handling the Berries	42
History of Vine	Introduction
Hot Pipes, avoid	20
How to judge	70, 71
Inarching	53—58
Judges	70, 71
Judging	70, 71
,, old and new methods	70, 71
,, by points	71
Kirk's system of heating	6, 7
,, vine and plant food	58
,, coarse grade of	14
,, fine grade of	36, 58
Lead on Bunches	28
Lady Downes	64
Lady Hutte	69
Leaves, sponging of	47
Lime	42

INDEX—CONTINUED.

	PAGE.
Loam	13, 15, 52
Louse, Vine	..49—51
Madresfield Court	65
Mealy Bug, to eradicate ..	48
,, ,, winter dressing for	48
Mildew..	42
Mrs. Pearson	44, 65, 69
Mrs. Pince	65
Mulching	20, 33, 34
Muscat of Alexandria ..	44, 65
Muscat Hamburgh	66
Muscat (Tinningham) ..	65
New System, when erecting	72, 73
New Varieties..	69
Over-cropping	31, 41
Pinching	23
Plant Food	14, 58
Planting	15
Pollination	26
,, ...	70
Pots, Canes for	58
Raisin de Calabre	66
Root pressure	15
Roots, gross	37, 40
,, lifting	37
,, pruning ..	37, 39, 40
,, fibry	40
,, aerial	45, 46
,, remedy for	37, 39
,, fungus on	46
,, treatment for	17, 20, 37, 41
,, relaying, time for ..	37, 41
Royal Muscadine	66
Rust	42
Scalding	35, 36, 46
Scorching	35
Second thinning ..	..29—31
Seed, Raising from ..	.. 51, 70
Shanking	.. 31, 40
Shoulders, tying up, etc. ..	29
Showing and Show Boards..	58, 62
Span Roof Vinery	7
Spider (red)	31, 41, 46
,, how to detect	.. 46, 47
,, how to destroy ..	47
Stoning	35
Stopping shoots ..	.. 21, 23
Storing grapes	66
Sublaterals	.. 23, 33
Sulphur	42
Syrian grape	66
Syringing	21
Temperature, first year ..	16
Temperatures	17
Tendrils ..	21, 23, 31
Thermometer (shaded) ..	21
Thinning berries ..	..29—32
Third thinning	31
Thrip, remedy for	47
Trebianna	66
Trellis	6
Trophy	53
Tufts, Striking in ..	.. 52, 53
Tying down shoots ..	.. 21, 23
Tynningham Muscat ..	65
Venos seedling	66
Ventilation	6, 12, 16, 35
Vine louse	.. 49, 51
,, ,, treatment for	.. 49, 51
Vine Scale	49
,, ,, first appearance of	49
,, ,, how to eradicate..	49
Vine weevil	.. 48, 49
,, ,, to capture	.. 48, 49
Vines, propagation :—	
,, , by cuttings	51, 52
,, ,, by seed ..	51
,, ,, by eyes	16
,, allotted space	15, 16, 72, 73
Warts on leaves ..	.. 44, 45
,, cause, prevention	.. 44, 45
Watering	33
Water-logged Roots	45
White Frontigan	66
White Neice	66
Winds, cold	35
Wood, ripening of	17
,, gross	.. 31, 40
XL all	47
Young Vines	23

KIRK'S
Up-to-date Vine & Plant Food.

The Best in the Market for all purposes.

No Cultivator of High-class Fruits and Vegetables should be without it.

Highest Awards International Exhib. Glasgow, 1901.

International Exhib. Ediar., 1891.

Champion Awards Shrewsbury, 1899.

Diamond Jubilee Medal Edinr., 1897.

t for Collection of Fruit d 2nd for 50 Guinea Cup, lin. International, 1905.

None Genuine without this Registered

Trade Mark attached to every Bag.

Highest Awards Crystal Palace, 189

Banksian Medal, Newcastle, 1896.

Corporation Award Edinr., 1896.

Gold Medal, Dublin, 18

3 Highest Awards Edinburgh, 1904.

Supplied in Two Grades.

Fine Grade—A Special Soluble Compound Manure.

Ton, £15 ; ½ ton, £7 10/ ; cwt. 16/- ; ½ cwt. 8/- ; ¼ cwt. 5/-

Coarse Grade—A Special Border Compound Manure.

Ton, £14 ; ½ ton, £7 ; cwt. 14/6 ; ½ cwt. 7/6 ; ¼ cwt. 4/-

SOLD BY ALL SEEDSMEN.

Important to Grape Growers.

KIRK'S PATENT

VINE & FRUIT BORDER SOIL-TESTER.

No. 3085.

All practical gardeners know that one of the grand secrets in Plant and Grape growing is to know when to give water and when to withhold it.

Never give a Vine Border a heavy drenching of water until you have tested the soil with this instrument, over-watering or under-watering will lead to bad results.

It is also an important Implement to Wood Foresters, as by its use the soil and state of the ground can be discovered before planting.

Full Instructions with each Instrument. **Price 14/6 each.**

Sold by all Nurserymen and Seedsmen.

Wholesale—KIRK & CO., 19, Salamander Street, LEITH.

Kirk's Up-to-date Vine and Plant Food.

50 GUINEA CUP.

Won by A. Kirk, at Royal Caledonian, Edinburgh, 12th September, 1906.

THE BEST IN THE MARKET FOR ALL PURPOSES.
NO CULTIVATOR OF HIGH CLASS FRUIT CAN AFFORD TO DO WITHOUT IT.

LIBRARY
OF THE
UNIVERSITY
OF
CALIFORNIA

Some of Pawson & Brailsford's Publications.

The

New Forestry,

or the

Continental System adapted to British Woodlands and Game Preservation.

BY

John Simpson,

Head Forester to the Right Hon. the late Earl of Wharncliffe, Wortley Hall, Sheffield, Yorkshire.

With Coloured Rainfall Map *Second Edition,*

$8\frac{1}{4}'' \times 5\frac{1}{4}''$ 220 pages, Illustrated. 15/- NET. Postage 4d. extra.

The Illustrations of German Forests, at all stages of growth from youth to maturity, are believed to be the first of the kind ever published, and are alone most instructive as showing clearly the marked difference between British and Continental Forestry.

Beautifully Illustrated.

Game and Game Coverts.

By JOHN SIMPSON,

Author of "The New Forestry," "The Wild Rabbit," &c.

Price 15/- Net.

"Chambers's Journal."—*October*, 1907.

"Mr. John Simpson, author of the 'New Forestry,' which was commended in 'Chambers's Journal' for 1900, has written another work of much practical value for landowners, gamekeepers, foresters, and all interested in making the most of game upon land. The book, which is copiously and beautifully illustrated, was suggested by the number of queries asked of Mr. Simpson as to the best game covert. Here he answers that question very fully, and discusses the importance of game preservation in these days of worry and losses connected with landed property. The whole book is of the most practical nature, and affords sidelights of an interesting and instructive kind upon the habits of our wild animals, and the best methods of rearing and protecting them."

"The Badminton Magazine."—*September*, 1907.

"Mr. John Simpson, author of 'New Forestry,' perhaps the best book on the subject ever issued, has produced another volume which will prove a real boon to all who have authority on estates on which game is preserved. . . . There are few who will not learn much from such a master of the subject as Mr. Simpson."

Quick Fruit Culture:

New Methods for Gardens Great and Small . . .

(in which is incorporated

"Pruning and Training Improved,"

etc., by the same Author).

8¼ in. by 5¼ in. 147 pages. — *Illustrated* — **7/6 net.** Postage 4d.

By JOHN SIMPSON,

Premier Medalist of the Société Nationale d'Acclimatation de France; Author of "The New Forestry;" "Improved Pruning and Training of Fruit Trees;" Report on Horticulture (Fruit and Vegetable Division) in "The Society of Arts Artizan Reports on the Paris Universal Exhibition of 1878"; "The Wild Rabbit and Rabbit Warrens, &c."

"Profitable Farm and Garden.—*March 2nd, 1901.*

". . . . Mr. Simpson has handled the subject very fully and ably. He deals first with the apple and pear, then with the plum, peach, apricot, cherry, fig, grape-vine, and bush fruits. Even oranges and bananas come in for attention. There are also chapters on root-pruning, ripening wood, &c. Illustrations are freely used to explain the details of the extension system, and the work from beginning to end is brimful of sound teaching, the result of some fifty years' experience as one of England's foremost gardeners. It is, indeed, a book that every fruit grower should have in his library—one to read and not merely for ornament."

Hand-book of

Farm Buildings, Ponds, &c., and their Appurtenances.

Fully Illustrated.

Price 6/6 Net.

Demy 8vo. 176 Pages

By THOMAS WINDER, A.M.Inst.C.E., M.S.A.,

Surveyor to the Duke of Norfolk's Yorkshire and Derbyshire Estates, and Agent to the Yorkshire Estates of the Earl of Effingham;

WITH A CHAPTER ON THE

Application of Electricity to Farming and Agriculture,

By J. W. BEAUCHAMP,

Deputy Manager of the Sheffield Corporation Electric Supply Department.

"The Field," *of May 23rd, 1908, says:*

"This is not a pretentious work, but it loses nothing in value and impor tance in that it is compiled from notes made by the author during thirty-fiv years' practice in the designing and re-construction of homesteads.

"His book covers a wide field in a thoroughly practical manner, for it object is not to suggest ideals, but to show how existing buildings can b re-constructed to suit modern requirements at as little expenditure as possible."

Crown 8vo, 222 pp., Cloth, 6/- net.

THIRD EDITION.

ENLARGED, ILLUSTRATED AND REVISED.

A BOOK FOR LANDOWNERS, SPORTSMEN, LAND-AGENTS, FARMERS, GAMEKEEPERS, AND ALLOTMENT HOLDERS

THE

Wild Rabbit in a New Aspect

OR

Rabbit Warrens combined with Poultry Farming and Fruit Culture.

By J. SIMPSON,

Consulting Forester and Horticulturist.

"The Shooting Times."—*April 11th, 1908.*

"The author goes minutely into every detail, and if those who desire to exper ment in wild rabbit farming will carefully peruse this book and follow the instruc tions contained in it there is no reason we can see why the venture should nc prove a success."

All Rights reserved.